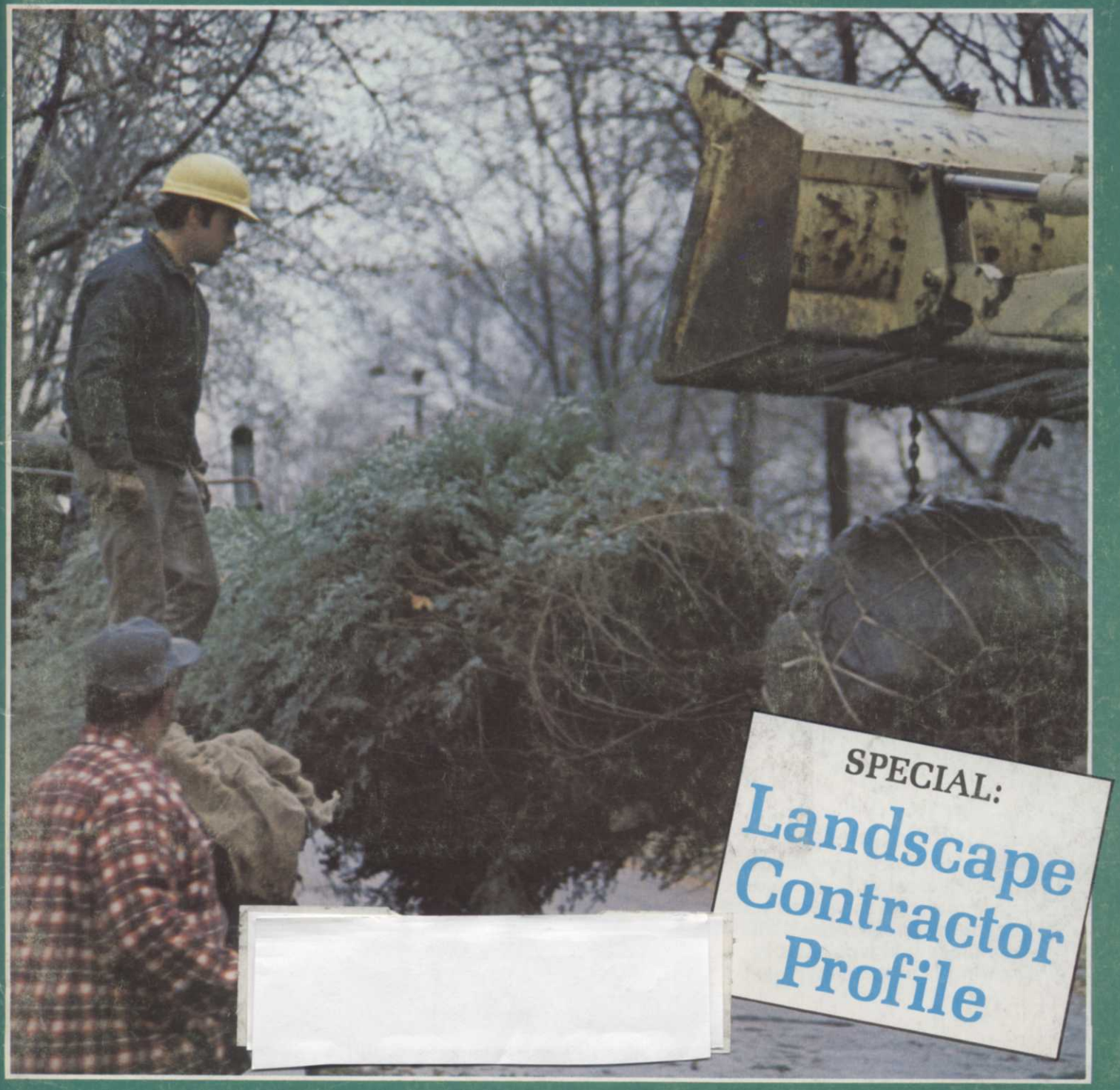
The Business Journal of Vegetation Management April 1978/$1.25

WEEDS TREES & TURF

Spring Small Engine Maintenance

Excerpt From New Irrigation Manual

Meet Our Advisory Board



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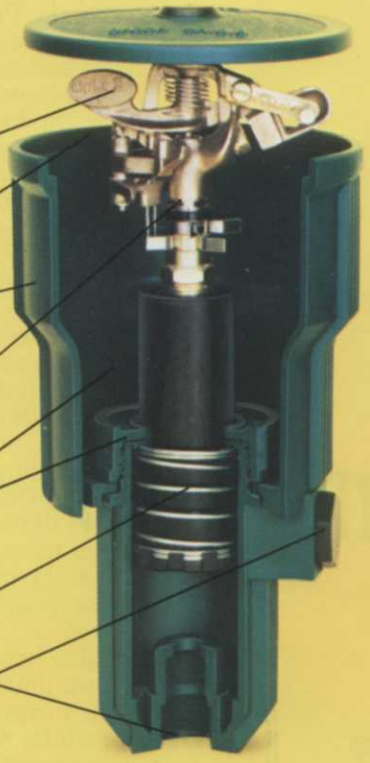

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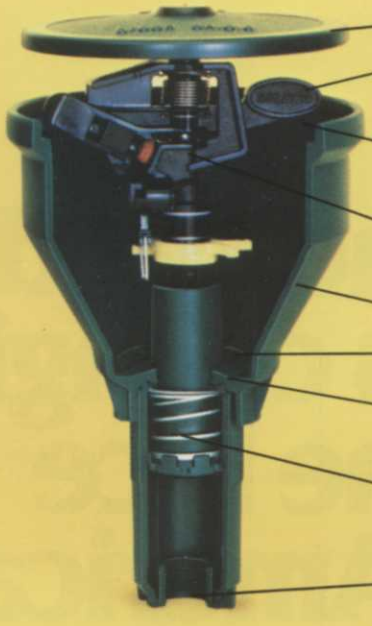

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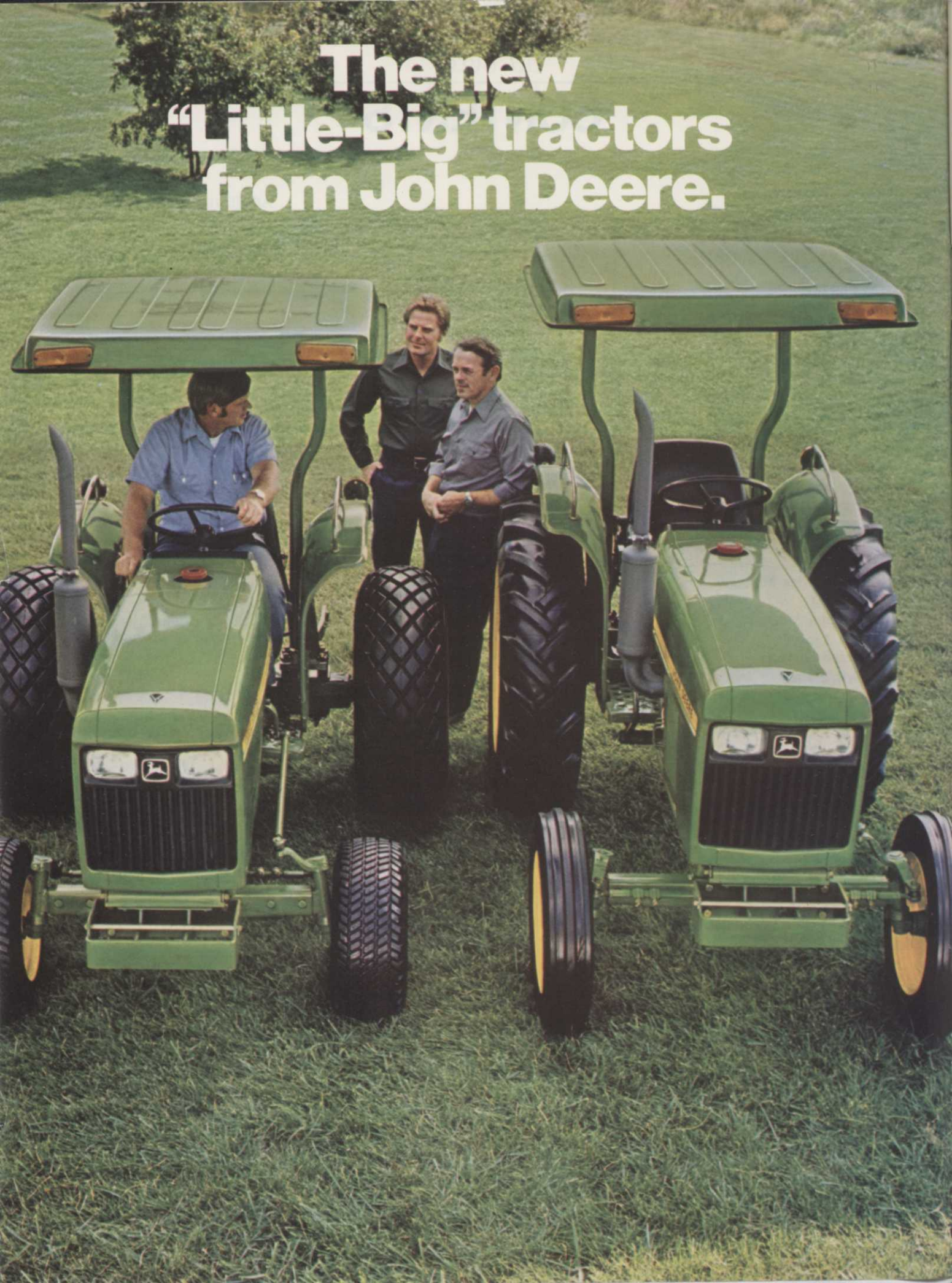
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WT&T

VIEWPOINT

Have you recently hired someone, changed jobs yourself, or won an award? If you have, we'd like to know.

The People page of this magazine is designed to let others know about you and your employees. It is too easy for us to print the releases provided to us by manufacturers with public relations departments. In this case, the easy way isn't really the best way.

We want to let all our readers know that your best worker was just promoted to route manager, that your designer won an award, that your son or daughter joined the business, that your association named your company or employee the safest, etc.

You don't need a public relations department to do this. You don't even need a typewriter. Use the reader comment card in this issue to write down the occasion, your name and phone number. We'll call you for more information and perhaps ask for a photograph of the honored individual.

If you do have a typewriter, just mail us a brief description, one page or less, and a photograph. The photo can be a black and white print, Polaroid print, or color print. Descriptions should include education and experience where applicable.

As all events aren't happy, there is also a need to let your friends in the industry know about deaths. We will treat obituaries with careful attention to the contribution made by the individual during his or her lifetime.

State and regional associations are invited to put WEEDS TREES & TURF on their mailing lists so that we may be alerted to newsworthy happenings in their area. One of our greatest goals at the moment is to strengthen the magazine's ties with regional associations. A newsletter contest for state and regional newsletters is in the works for later this year. We don't want to leave anyone out of the contest.

This month we are announcing the magazine's first industry advisory board. Each member has been asked to provide his comments about

his particular field. We are publishing their comments so that you can get an idea about what they stand for. We invite your remarks about their comments. This discussion between you and the Board members could very well bring some problems or misconceptions to light. We can all benefit by healthy and open discussion of the good and bad points of our industry.

Finally, what looks to be a very good year for the Green Industry has begun. Everyone is in the midst of the spring rush. We wish your business great success this year and hope you will use the product of our labor to your beneft.

Bruce F Shank

By Bruce F. Shank, Editor

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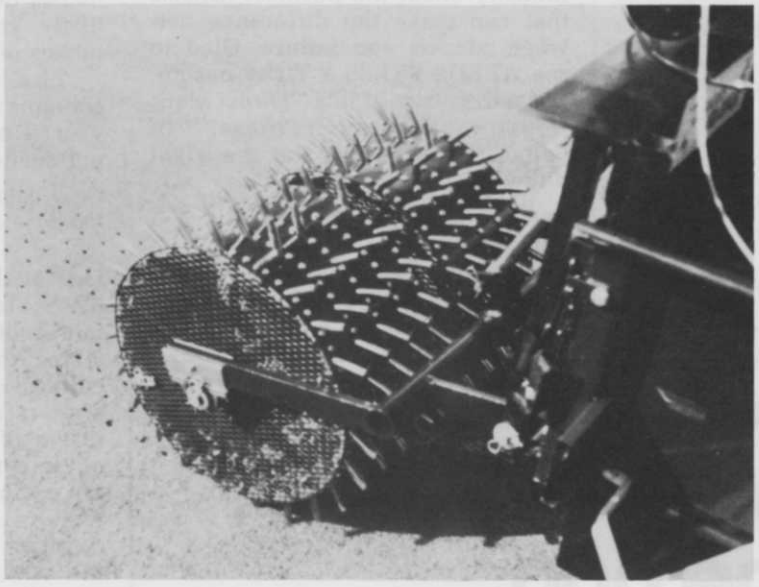

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LETTERS

After 40 years experience in various phases of the Green Industry, I am convinced that there are more business failures attributable to a lack of applying sound business practices than to any other cause.

Since most people in our industry love their work, they seek to constantly expand their knowledge of the latest technological developments in our field. Until recently, there has been almost nothing available to the vegetation management industry about the business aspects that can make the difference between success and failure. Glad to see WEEDS TREES & TURF becoming more aware of this. "Direct Mail: Boost to Spring Business," in Feburary, is a step in the right direction.

Samual Virgilio, President
Lawnkare Inc.
Bryn Mawr, Pennsylvania

Thank you Mr. Virgilio. We intend to bring you more such information in the near future. Bookkeeping, legal tips, and personnel management features are in the works.

The recent Proscape article (February) on sand trap construction was much enjoyed. However, a gravel base under six inches of sand causes an air-water interface which actually impedes movement of excess water from sand into pipe. If the sand in trap is medium coarse and 12 inches deep, gravitational pull will likely keep the top two to three inches of sand relatively playable.

The question and answer columns are a great improvement in your continuing excellent publication.

G. D. Chaster
Victoria, B.C. Canada

One of the current activities of the SW-244 Irrigation Management Committee of the Soil and Water Division, American Society of Agricultural Engineers, is to compile a cross-referenced listing of manufacturers of irrigation controllers, the equipment they manufacture, and the performance features of the controllers now available. We will develop a survey questionnaire to the manufacturers for a response regarding each of the models that they wish to see listed.

In order that this listing be as complete as possible, we need to contact all manufacturers of irrigation control equipment. We are asking that any manufacturer desiring to participate in this survey contact us with the following information: company name, address, telephone number, and the name of a contact person to whom we should send the survey. This information should be sent to: Ken Solomon, 1755 Foothill Drive, Logan, Utah 84321.

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GREEN INDUSTRY NEWS

SEED

Burning limits due this month in Oregon

The U.S. Environmental Protection Agency's regional office in Seattle hopes to decide by mid-April on the amount of land in Oregon that can be set aside for field burning by the state's grass seed growers.

Although state law limits the burning to 50,000 acres, the Oregon Seed Council is requesting that 180,000 acres be used this year to prepare the land for the 1979 seed crop. Opposition has formed in Eugene and Springfield, with groups there saying that particulates from the burning fields create a health hazard and violate the federal Clean Air Act.

Oregon Assistant Attorney General Don Arnold said he believes the farmers will be allowed to burn between 100,000 and 120,000 acres. "They (EPA) hinted they would allow something over the 50,000-acre limit," he said.

Dave Nelson, executive secretary for the Oregon Seed Council, said his group is working on a proposal to permit use of 180,000 acres, by using burning methods that would reduce particulate levels by about one-third. Nelson said backfiring and strip-lighting would be used.

However, he said the group is prepared to go to court if the EPA does not grant the 180,000-acre limit or its equivalent. "We will definitely take the appropriate legal action if we're stuck with less than 180,000 acres," he said. The council has asked the state's growers, which number about 1,000, for contributions to pay for possible legal fees. It will soon approach the seed companies, Nelson said.

A 50,000-acre limit will cause a gradual deterioration of seed quality and between a 25-75 percent reduction in the amount of seed produced for the 1979 crop, Nelson said. "If we can't clean it up (by burning), we won't get the tillering to produce the extra stock shoot growths out of the plant," Nelson said.

The Seed Council feels burning has done little to violate the clean air standards in Eugene and Springfield. A recent air sampling in the two cities revealed that only one station recorded violations in the amount of particulates, Nelson said, and that dust accounted for 57 percent of the particulates. The station is near a gravel parking lot and dust from cars driving in the lot probably caused the high levels, Nelson said.

University of Nebraska turf specialist Dr. Robert Shearman spoke to superintendents about preemergents and their affect on bluegrass.

GOLF

GCSSA takes over San Antonio

Both San Antonio, Texas, newspapers carried front-page headlines about one of the largest conventions to be held there since the World's Fair, the 49th International Turfgrass Conference and Show, Feb. 12-17.

More than 5,500 attendants saw a record 200 exhibits and availed themselves of an expanded educational program. Special educational sessions were held for management, public golf, research, equipment, turf, personnel management, and even weather.

Former Secretary of Agriculture Earl Butz kicked off the program with a joke-laden speech defending the profit motive against a mismanaged onslaught of government environmental and consumer regulators. Butz predicted that the trend toward more leisure time and shorter work week would favor growth in the golf market. Emphasizing the importance of adapting to change, Butz recommended constant innovation to fight off the effects of spiraling inflation. "There is a feeling in this country that making a profit is evil. We've got to educate consumers to the fact that profit is not a four-letter word."

During the opening ceremonies, outgoing GCSAA President Ted Woehrle presented the Association's highest award, the Distinguished Service Award, to Dr. Roy Goss, Washington State University turf specialist; Dr. John Harper II, Pennsylvania State University extension agronomist; and Arthur Snyder, retired superintendent of Paradise Country Club, Scottsdale, Ariz.

More than 40 speakers participated in the educational and general

sessions. The research sessions were well-attended signifying increased interest in future turf techniques.

Regional topics were covered in special sessions on southern, northern, and western turf problems.

Texas A&M's Dr. Richard Duble discussed bentgrass/Bermuda grass transition in the South. May and October are two months where greens undergo transition from one grass to the other and consequently golf courses look yellow at these times. Duble said the problem can be minimized with a program of overseeding, aerating, verticle mowing, and topdressing at the proper times. He recommended earlier (March) aeration and topdressing in the spring to encourage the Bermuda before the bentgrass goes out in May, and summer (August) aeration and topdressing combined with vertical mowing and applying fungicides in September to promote the bentgrass.

Other tips offered by Duble were a one to one nitrogen to potassium fertilizer ratio and the use of MSMA for control of nutgrass. Duble said eradication of nutgrass is essentially impossible and only control is feasible.

Dr. Victor Gibeault of the University of California, Riverside, presented the results of a survey of California's 600 golf courses. He identified three distinct regions of the state.for golf courses; southern California with its warm climate and cucuya grass fairways, inland with a subtropical climate, and northern California with a cool climate where bluegrass predominates. A very low percentage of California superintendents use fungicides, Gibeault pointed out.

Dr. Robert Shearman, turf specialist for the University of Nebraska, warned that use of preemergents on bluegrass can cause side effects. Shearman said preemergents can reduce root growth of bluegrass, thin rhizomes, and add to thatch buildup if overused. Shearman said use preemergents only when necessary and provide supplementary irrigation because some preemergents lower the water uptake of desirable grasses.

Dr. Joseph Vargas Jr., associate professor of plant pathology at Michigan State University, described the specific susceptibility of *poa annua* to anthracnose in warm weather. Vargas said *poa annua* is highly susceptible to anthracnose when the temperature gets above 80 degrees. He recommended use of summer fertilization (½ lb./1,000 sq. ft.) to discourage anthracnose if nights are cool. If both days and nights are hot the only solution is a good fungicide and, Vargas said, the reluctance to use fungicides doesn't make sense when you consider the investment already in the turf. To risk the entire investment for the cost of fungicides is foolish he implied.

New GCSAA officers elected at the meeting are George Cleaver of Chestnut Ridge CC, Lutherville, Md., president; Charles Tadge, Mayfield CC, S. Euclid, Oh:., vice president; and directors David Holler of Gulph Mills Golf Club in Prussia, Pa.; James Wyllie, Lambton Golf and CC, Toronto, Ontario; and Melvin Lucas, Garden City CC, Garden City, N.Y.

TREES

Ice storms to add to spring business

National Arborist Association Executive Secretary Robert Felix predicts the recent ice storms in the Midwest and the Northeast will result in a huge amount of corrective maintenance work for regional arborists.

Felix said the work, when added to normal spring maintenance business, may test the arborist's ability to meet such a large, unplanned demand for service. Felix also said the demand will take place as homeowners and commercial caretakers begin their spring property inspections.

NAA just gave Felix a new three-year contract as executive secretary of the growing organization.

RECLAMATION

Field trips set for Canadian meeting

The Canadian Land Reclamation Association will hold its Third Annual Meeting from May 29-June 1 at Laurentian University in Sudbury, Ontario, Canada. Approximately 44 papers will be presented and all day field trips to reclamation sites will be conducted on Tuesday, May 30 and Thursday, June 1.

Following is a list of just a few of the paper presentations:

—The establishment of vegetation on high iron-sulphur tailings by means of an overburden.

—Revegetation of tailings area and other disturbed lands.

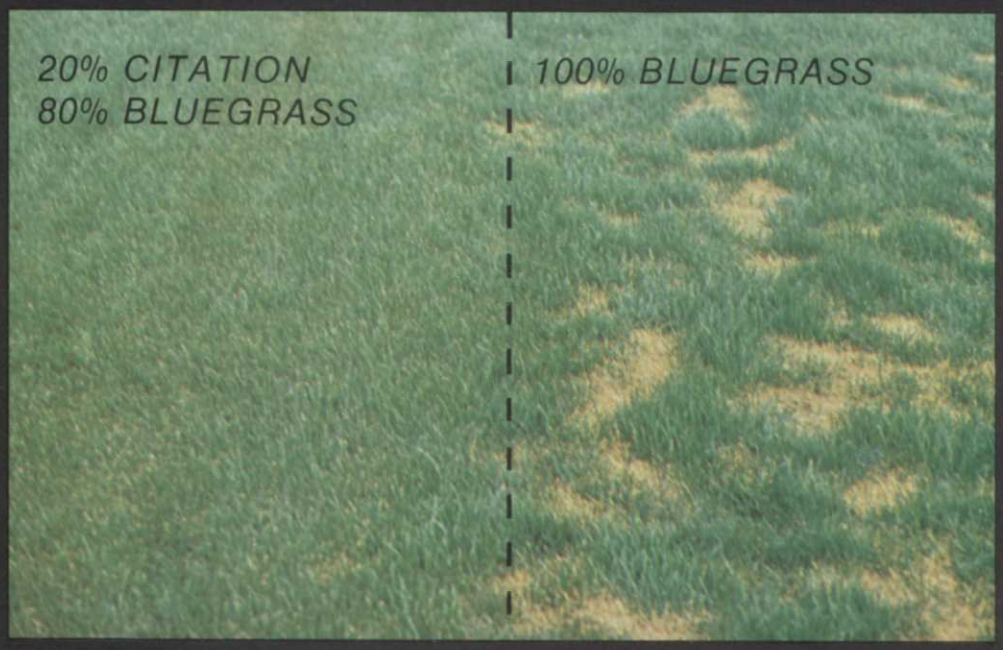
—Preplanning of a deactivated mine site for aesthetic and wildlife improvement.

—Environmental considerations for reclamation of abandoned mine spoils.

—Evaluation of unconsolidated materials for plant growth.

—Reclamation of abandoned coal mined lands in the U.S.

The National Interior Plant Environment Committee was formed recently in Washington, D.C., by representatives of landscape industry associations and design related societies. They are: (seated l. to r.) Charles Blumberg of IBD and Karl Korstad of ALCA; and (standing l. to r.) Kent Slepicka of ASID, Walter Gammel of FFA, and John Gattuso of ASLA.



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The above photo was taken of a test plot located in California. The Fusarium blight has devastated the bluegrass stand on the right. On the left, the balanced plant population using twenty percent Citation perennial ryegrass and eighty Kentucky bluegrass is unaffected by the Fusarium. Citation's ability to withstand high temperatures and high humidity helps to maintain a quality turf and balanced plant population during stress conditions. An added plus is Citation's dark green color and improved mowing qualities.

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—Thirty-two years of co-operative range improvement and land reclamation in the U.S.
—The use of antitranspirants and individual tree mulching as an aid to the establishment of trees on surface mine spoils.
—The use of sawmill residues as a soil amendment on eastern Kentucky surface mines.

TREES

NAA Florida meeting has record attendance

More than 250 arborists traveled to Sarasota, Florida, in February and, although the weather didn't cooperate, the trip was extremely worthwhile.

The ladies program featured speakers on accounting practices, handling insurance claims, planning short term loans and investments, managing safety and other regulatory programs, and overseeing public relations programs.

In the general session, Rex Russell, assistant chief of the U.S. Forest Service spoke on the role of the commercial arborist in urban forestry programs as the Forest Service sees it. New and proposed legislation will direct the Forest Service into the urban areas. The arborist will play a vital part in the programs of the Forest Service in the future.

Jeff Kahn, an engineer with Ford Motor Co., spoke on preventative maintenance of equipment. Gregg Dujets, an audiologist discussed hearing problems of arborists. Dujets said the arborist can suffer measurable loss of hearing without proper protection. Robert Herder, vice president of Asplundh Co. spoke on safety in tree care operations.

Warren Purdy, a management consultant to the landscape industry, was the featured speaker. His topic was financial management of tree care companies. Purdy provided part of the educational role in the ladies' sessions also. An estimators' session was chaired by NAA Executive Secretary Robert Felix.

Winners of the first NAA Awards of Merit were Dr. Paul Tilford, the first executive secretary of the group; Ross Farrens, past president and charter member; and Ed Irish, past president and chairman of the educational committee.

GOVERNMENT UPDATE

Velsicol, EPA reach chlordane agreement

Velsicol Chemical Corp. announced in March that it had reached agreement with the Environmental Protection Agency, the Environmental Defense Fund, and other interested parties, permitting certain uses of chlordane and heptachlor previously suspended. Chlordane hearings started in 1974.

The agreement, which discontinues most home uses, will cut Velsicol's production of the two pesticides from 23 million pounds to 7.2 million pounds per year until 1983. Under the terms of the agreement, Velsicol may apply for new registrations of the products in the future. No limitations were placed on exported uses for the chemicals.

Allowed by the agreement are:
—use of chlordane for control of imported fire ants and Japanese beetle larvae in nursery stock for compliance with Federal or state quarantines, and in nursery stock to control black vine weevil for compliance with state nursery certification regulations, up to January 1980.
—use of chlordane for control of imported fire ant on lands not presently used or to be used for food or feed production or grazing for a period of two years following treatment, up to January 1981.
—use of chlordane for control of white grubs, strawberry rootworm, strawberry rootweevil or crown girdler, strawberry crown borer and black vine weevil in strawberries up to August 1979.

Du Pont rebuts RPAR on fungicides

The E. I. Du Pont de Nemours Company has formally rebutted the RPAR issued by the Environmental Protection Agency last August against registration of the EBDC fungicides. In a 12-volume statement, summarized in an 89-page discussion of the EPA presumptions and review of the benefits, the company reported that proper and common use of two EBDC fungicides, maneb and mancozeb, does not cause adverse effects. Tersan LSR is the trade name, under the common name of manzeb, for Du Pont's turf fungicide labeled against leaf spot, rust, and rhizoctonia brown patch.

The rebuttal reported studies that demonstrate that the EBDCs and their metabolite, ethylenethiourea (ETU), degrade rapidly and do not persist or buildup in the environment. Studies have also demonstrated that EBDCs are not teratogenic, that is, they do not tend to cause developmental malformations. Thus, human exposure to EBDCs or ETU is insignificant, according to Du Pont.

Under the RPAR procedure, the EPA may now return the EBDC fungicides to normal registration status or it may begin to evaluate the benefits of these compounds. Meanwhile, the fungicides will continue to be available.

Uniroyal questions EPA's MH test

Uniroyal Chemical Co. has termed an EPA test inadequate to justify a rebuttable presumption against registration (RPAR) for maleic hydrazide, an important growth regulator. The company questions a test for oncogenicity contending that the number of animals used in the test and errors found in the report make it unreliable as evidence for RPAR. A similar test is currently in progress by Uniroyal and results are expected by 1980.

PEOPLE

Three new vice presidents have been appointed at the Toro Co., Minneapolis. **Gary Richard Holland** has been named vice president-general manager of the new Outdoor Appliance Div. **Kenneth D. Larson** has been appointed vice president-manufacturing and engineering in the Outdoor Power Equipment Group. New vice president-marketing and sales in the Outdoor Power Equipment Group is **Robert J. Moeller.**

Barry L. Bartlett has been appointed vice president distribution at Massey-Ferguson Inc., North American Operations, Des Moines, Iowa. He succeeds **Murray A. Thorndycraft,** new president of Badger-Northland Inc., Kaukauna, Wis., a Massey-Ferguson subsidiary specializing in farmstead equipment.

John B. Arnaiz has been named manager of engineering by Willson Products Div., ESB Inc., Reading, Pa. He will have responsibility for research, development, design, and quality control of personal safety equipment manufactured by Willson.

Deppe Ag-Tec Ltd., Burlington, Ont. has appointed **J. V. Little** sales manager for the firm's outdoor power equipment markets in the U.S. and Canada.

Joe Tanouye, Redwood City, Calif., has been installed as the 27th president of the California Landscape Contractors Association at the group's recent annual meeting. He succeeds **Bill Kessloff,** Stanton, who has become chairman of the board.

New vice presidents elected at the meeting include **Jim Keener,** Newbury Park; **Ken Gerlack,** Martinez; **Clifton Christmas,** Compton; and **Don Napolitano,** Montebello. **Bart Bartman,** Huntington Beach, was elected treasurer, and **Mickey Strauss,** Van Nuys, was named secretary.

Jack A. Best has been named national field development manager for the Commercial Development Department, Agricultural Business Group, Velsicol Chemical Corp., Chicago. Formerly, he was regional manager in the same group.

New president of the Idaho Research Foundation is **Dr. Robert R. Furgason,** dean of the College of Engineering, University of Idaho (UI), Moscow, Idaho. **Dr. Raymond J. Miller,** associate dean, College of Agriculture and director, Agricultural Experiment Station, was elected vice president. **Robert N. Steele,** UI trust and investment officer, was reappointed secretary-treasurer.

John B. Arnaiz

Barry L. Bartlett

Jack A. Best

Dr. Larry S. Murphy

Lawrence L. Carville has been retained as executive secretary by the Connecticut Nurserymen's Association and by the New England Nurserymen's Association. He runs Horticultural Associates, Tolland, Conn., and has been active in various regional professional associations. He succeeds **Charles Barr,** who will be retained by both groups on a consulting basis.

Dr. Larry S. Murphy has become western midwest director of the Potash/Phosphate Institute, Atlanta. He is professor of agronomy at Kansas State University and will direct cooperative programs with agriculture and industry in Kansas, Nebraska, North Dakota, South Dakota, Colorado, and Wyoming.

New officers of the South Carolina Plant Food Educattion Society are **Jack Hartley,** Carolina Chemicals Inc., president, and **John Sitton Jr.,** Pendleton Oil Mill, vice president.

Directors for three-year terms are: **Bruce Duncan,** Royster Co.; **Jim Gravitt,** C. E. Gravitt Inc.; **John Hill,** Columbia Nitrogen Corp.; **Jim McKelvey,** BASF Wyandotte Corp.; **Ed Murphy,** IMC Corp.; and **Bob Pearson,** Swift Agri-Chemicals Corp.

Gary Bailey has been named national sales manager, Moody Sprinkler Co., Santa Ana, Calif. He has been with Moody for five years.

Paul L. Smeal, professor of horticulture at Virginia Polytechnic Institute, Blacksburg, Va., has been elected president of the American Society for Horticultural Science, Southern Region. He has served on the society's executive committee for six years.

James W. DiVall has received an honorary membership from the North Central Weed Control Conference. He is product development manager-midwest region, Stauffer Chemical Co., Omaha.

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MOWER ENGINE TROUBLE SHOOTING

When you pull out a trim mower in the spring and it won't start, temptation is just to replace it with a new one. Very often, a few hours labor on a rainy day and a few dollars worth of parts can give you another season from that mower. Weigh the costs of repair against the cost of replacement.

WEEDS TREES & TURF went to Morris Mower and Small Engine Repair to find out what the typical causes of small engine failure are. Clint Morris, who runs the shop, has been repairing small engines for 20 years. He attends all the manufacturers' schools to keep abreast of small engine technology.

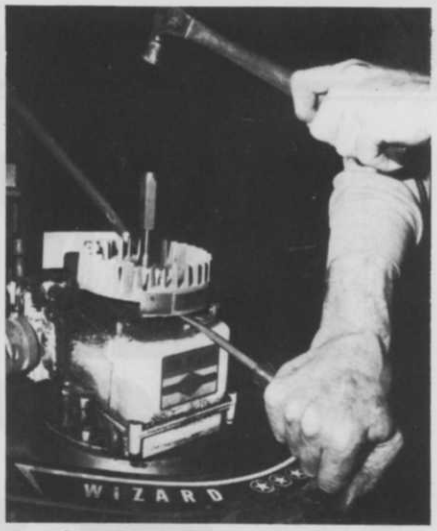
"If a small engine has been properly taken care of, oil changed, filter cleaned, blade sharpened, and the mechanical parts are sound, getting it to run properly is simply a matter of getting the spark and fuel to meet in the right place at the right time," according to Morris.

If an engine is otherwise mechanically sound, test for spark by holding the spark plug wire close to, but not touching, the spark plug. Pull the starter rope. Blue sparks should arc between the wire and the plug.

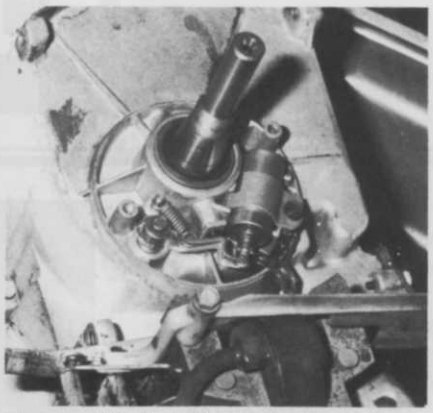
If there is no spark, it is necessary to replace the points and condenser and time the engine. First step is to loosen the bolt holding the air filter and remove it.

Remove the three bolts that hold the engine housing in place. Grasp the housing by the top and lift sharply.

There are special tools to remove the starter clutch, but in lieu of these; a soft wooden block and hammer will do. The clutch loosens in a counter-clockwise manner, so place the block against one of the ears of the clutch and hit the block with a hammer until the clutch is free. It should then spin off.



Guarding the threads on the crankshaft, place a screwdriver under the edge of the flywheel and press down. Tap the top of the crankshaft with the hammer and the flywheel will break loose. There is a cupped spring washer under the flywheel.



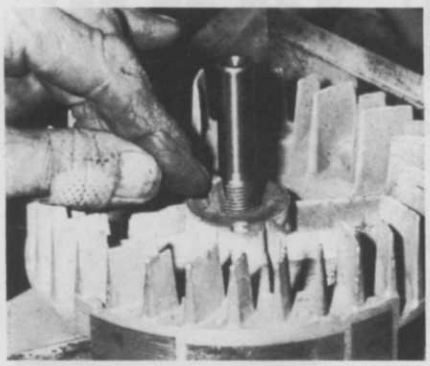
Two small bolts hold the dust cover over the points and condenser. Remove the cover to expose the points.

The points in this photo have a white, pitted surface, indicating they need to be replaced.

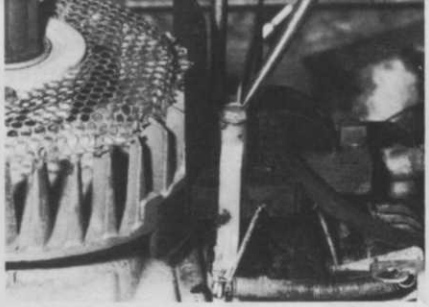
Remove the bolt holding the clamp in place over the condenser. There is a small plastic tool provided in new point and condenser kits to aid in removing the wires from the condenser. Place the piece over the spring of the condenser and compress it until the wires pull free. Install the new condenser by compressing the spring until the wires enter the hole. Reinstall clamp and tighten.

Remove the bolt holding the point assembly and remove the points, with spring attached. Install the new points in the same manner. In order to gap the points correctly at .020, it is necessary to rotate the engine so that the slot in the crank shaft points towards the rear of the engine (away from the cylinder head).

Insert a feeler gauge between the points and adjust the gap by loosening the condenser and moving it. There should be only minimum resistance as the gauge is pulled through the points.



Reinstall the dust cover and tighten it. Place the spring washer back over the crankshaft with the cup up. Line up the grooves in the crankshaft and flywheel so that the aluminum key will slip in without force. Always use an aluminum key in this slot. If the key is bent or damaged, it will affect the timing of the engine.



The engine is timed by adjusting the air gap between the legs of the magneto and the magnetic surface of the flywheel. A postcard is just the right thickness for this. Loosen the two screws holding the magneto and move it for the right gap. Replace the starter clutch and tap it with the wooden block and hammer in a clockwise manner until it is secure. Replace the trash screen. Clean the air filter element in kerosene or hot soapy water. Saturate it with oil and squeeze out the excess.

Fill the gas tank half full and attempt to start it. Screw in the idle mixture screw (clockwsie) until snug. Back it off one and one-half turns. Unless something is wrong with the carburation, the engine should start. If it starts but fails to respond to the idle mixture screw, this indicates warping between the faces of the carburetor and gas tank. Briggs & Stratton Repair Kit#391413 will correct this.

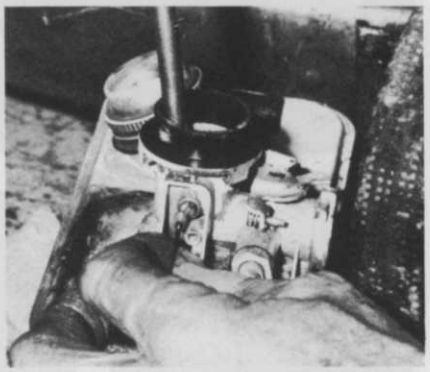
Remove the control cable from the engine housing. Lift it up and slide it out of the hole in the carburetor control plate. Remove the screw in the back and the side. Make sure you don't lose the spacer behind the side screw. Remove the spring from the control plate, being careful not to stretch it. Lift the tank and tilt it to remove the governor linkage wire.

Remove the choke linkage cover and slip the linkage free of shaft.

Remove the bolts holding the carburetor to the gas tank and lift the carburetor free.

Place the pin from the repair kit in the hole as indicated and place the small teflon washer over the pin.

Place a 5/16-inch bolt behind the choke valve as shown.



This places the proper tension on the choke valve spring. Replace the linkage in its shaft and replace the cover to hold it in place. Tighten the carburetor to the gas tank. Attach the tank-carburetor assembly to the engine, tilting it to attach the governor linkage before securing it. Attach the governor spring and the control cable.

The control plate must come into contact with the point indicated by the pliers in order to stop it. Raise it up if necessary. Refill the tank at least half full. Start with the air filter off, but replace it after the engine starts and before making any adjustments. Adjust the idle mixture until the engine is running smoothly.

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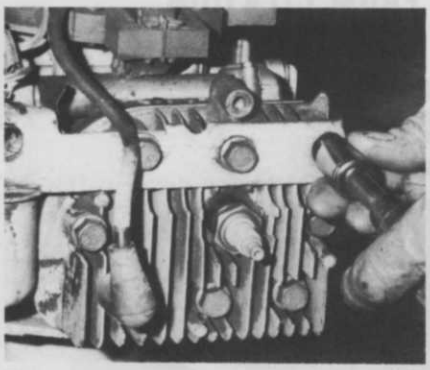
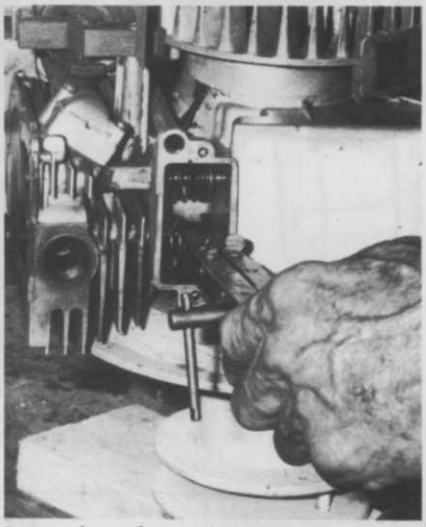
Loss of compression in a small engine is a result of three things: either the cylinder head gasket is leaking, the piston rings are not sealing (engine will also burn oil), or the valves are not seating properly. To check for compression, spin the flywheel clockwise against a compression stroke. Good compression is indicated by a sharp rebound.

If valve grinding is necessary, there are six special tools required, all but two are inexpensive. A valve spring compressor runs about $6.00. A valve refacer can cost approximately $8.00. The wooden handle cup grinder for about $.75. The valve seater costs approximately $60, but there are cheaper versions available. A torque wrench is necessary to retighten the head bolts properly.



First step is to remove the head bolts. Note the positions of longer and shorter bolts as these must go back into the proper holes. Place the bracket removed to the side, being careful not to stretch the governor spring. Disconnect it if necessary. Inspect the head gasket for gaps that might cause loss of compression.

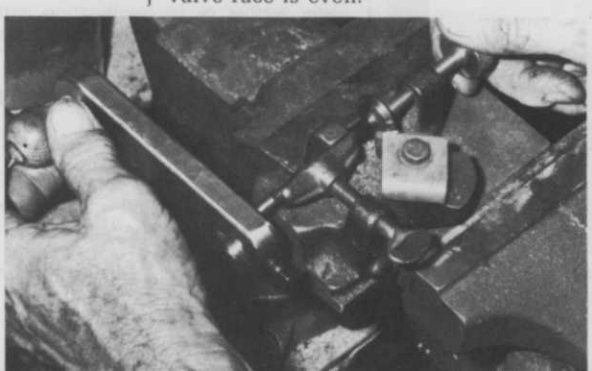
Remove the cover over the valve springs.



Insert the valve spring compressor over the spring and valve retainer clip. Tighten the tool to compress the spring and tilt it to remove the clip from the end of the valve.

Remove the valve from the engine and insert it in the refacing tool handle as shown. Both seat and valve angles are 45°.

Place it in the refacing tool and tighten the bolt shown on the right until the valve face is against the cutting unit. Turn the handle while tightening the bolt until the valve face is even.



It is also necessary to reface the valve seat. The tool shown is inserted in three pieces. First the pilot.

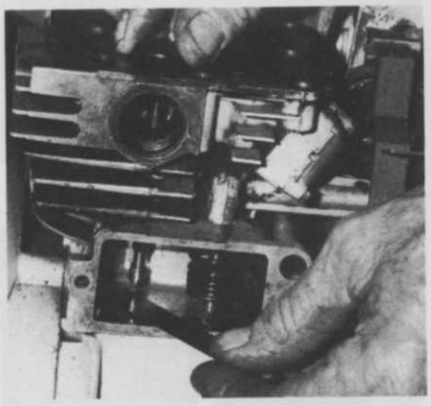
Then the counterbore.

Then the cutter handle. Rotate this unit until the seat is smooth.

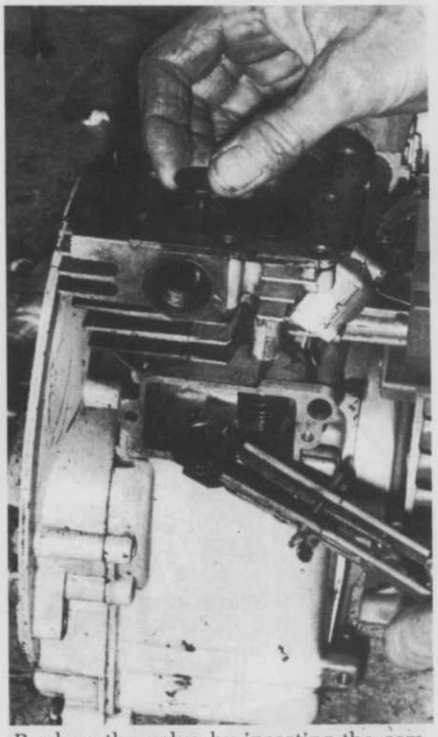
It is necessary to lap the surfaces of the seat and face together so that they mate properly. Clean the top of the valve and press the suction cup onto it. Apply grinding compound to the face of the valve.

Rotate the wooden handle between your hands while pressing down . . .

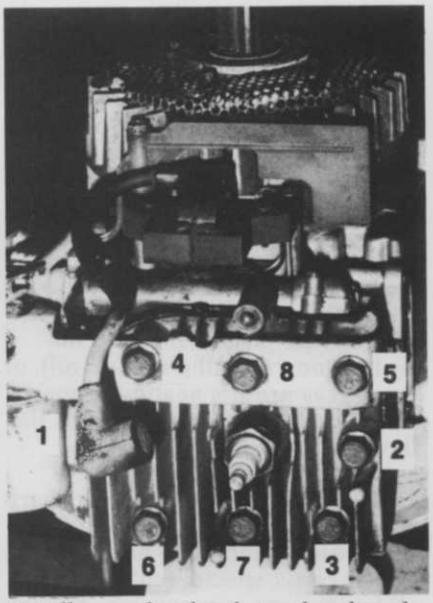
. . . until there is a smooth ring ground completely around the valve face and seat.



If much material was removed, it may be necessary to widen the gap between the valve and tappet. Insert the valve into the engine and check with a feeler gauge for .005-.007 for the intake (smaller) valve and .009-.011 for the exhaust. Grind only a minimum at one time until the proper gap is reached.



Replace the valve by inserting the compressed spring into the engine and sliding the valve through the spring and slipping the retainer clip over the end of the valve. Release the spring and remove the tool. Repeat the sequence for the other valve.



Install a new head gasket and replace the head with the proper bolts in the right holes. Tighten the bolts finger tight. Be sure and replace the bracket. Tighten the bolts in sequence, a little at a time, until the proper torque is reached. Tightening one much more than the others will result in a warped head. Proper torque is 140 inch pounds.

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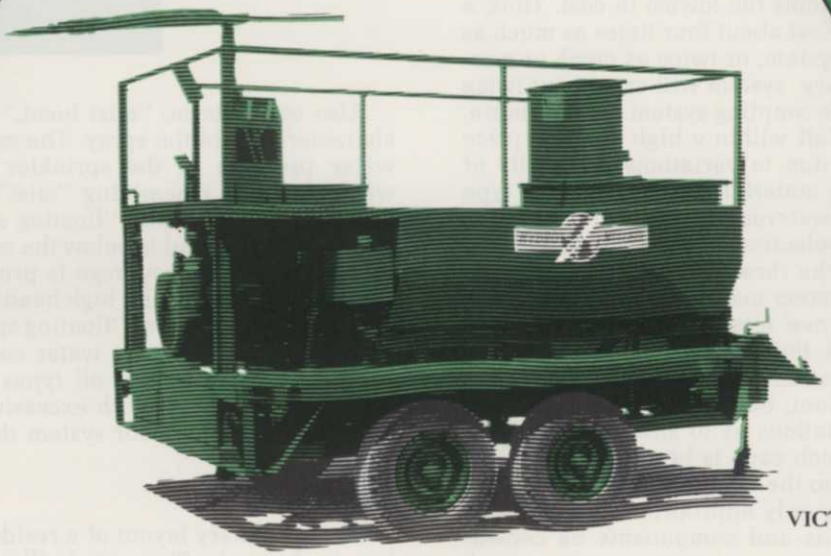

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SPRINKLER EQUIPMENT FROM IRRIGATION MANUAL

By James A. Watkins, Director of Training, Weathermatic Div., Telsco Industries.

Sprinkler systems for turfgrass and landscaping are classified under three basic types characterized by the kind of equipment utilized:

(1) Spray Systems
(2) Rotary Systems
(3) Quick-Coupling Systems

The cost of the three types of systems is in an approximate ratio of 4 - 2 - 1; spray systems being the most expensive, rotary systems intermediate, and quick-coupling systems the lowest in cost. Thus, a spray system will cost about four times as much as a quick-coupling system, or twice as much as a rotary system; a rotary system will cost about twice as much as a quick-coupling system. Furthermore, each system will fall within a high and low price range of its own due to variations in quality of equipment, piping material selected and the type of property to be watered.

An intelligent selection cannot be based on the relative prices of the three systems alone. For example, a rotary system may meet a budgetary requirement, yet prove totally inadequate for the size and shape of the property or the watering conditions. Application of the three systems overlaps to a great extent, but their adaptability does impose some limitations as to size and nature of the project for which each is best suited.

Before going into the many aspects of sprinkler system design, it is only appropriate that application, relative merits and components be considered first.

SPRAY SYSTEMS

The versatility of spray systems accounts for their extensive use for all types of properties. In spite of their higher cost, spray systems are the most popular because they offer the ultimate in automation, efficiency, convenience, labor savings and aesthetic value.

There are no fixed limitations on the size of project to which spray systems may be adapted, except those imposed by economics.

The sprinkler heads used in this type system discharge a fine, uniform spray. These sprinklers are sometimes referred to as "mist" heads, but this is a misnomer because the spray more nearly resembles small rain-drops.

The following article is an excerpt from the Sprinkler Equipment chapter of the TURF IRRIGATION MANUAL by James A. Watkins and is reprinted with permission of the author and the publisher, Telsco Industries. Other chapters of the TURF IRRIGATION MANUAL include Piping, Hydraulics, Water Hammer, Cross-Connection Control, Pumps, Clean Water, Sprinkler Performance, Plot Plans, Head Layout, Pipe Sizing and Zoning, Rotary System Design, Golf Course System Design and Electrical. In addition, the book has 60 pages of design reference tables.

The author, James A. Watkins, is presently director of training for the Weather-matic Division of Telsco Industries and has more than 40 years involvement with turf irrigation. Copies of the TURF IRRIGATION MANUAL are available for $19.50 each plus $1.25 shipping and handling (U.S.) from Telsco Industries, P.O. Box 18205, Dallas, TX 75218.

Use of the term, "mist head," stems from the characteristics of the spray. The correct amount of water pressure at the sprinkler will form fine water droplets resembling "mist" floating above the spray. Lack of any "floating spray" indicates pressure to the head is below the required amount. In such cases, the coverage is probably deficient. Conversely, abnormally high head pressure causes an excessive amount of "floating spray" which will blow away and increase water costs.

Sprinkler systems of all types with low pressure, and sometimes with excessive pressure, are the direct result of poor system design.

Spray Heads

An exemplary layout of a residential spray system is shown in Figure 1. It illustrates the wide variety of heads in different capacities, spacings and coverage patterns required to provide complete and uniform watering.

POP-UP HEADS. Spray heads for installation in lawns are pop-up types, often referred to as "lawn heads." These heads are installed flush with the turf. A nozzle pops-up to deliver the spray during operation and recedes within the body when inoperative.

Nozzles. The normal area of coverage for pop-up spray nozzles varies from 16 to 30 feet in diameter, in increments of one or two feet, depending on the nozzle or orifice size. Available increments may be more than two feet for large diameter sprays. Shorter radii are available in part circle. Heads are spaced at close intervals (generally 10 to 24 feet apart after making allowances for the required overlap).

Spray nozzles are available in a wide assortment of part-circle patterns. The usual assortment of arcs ranges from ¼ circle to ¾ circle in increments of ⅛ or 1/3. Special arcs for custom system design situations are usually available in 10° increments from 60° to 270°.

Orifices of nozzles are sized to provide a specified radius of coverage and flow at a specified pressure. The specified pressure must be provided by the system designer to obtain proper coverage. If pressure is too low, the spray will not "break-up" into the required fine water droplets

Spray system heads discharge a fine, uniform spray. The correct amount of pressure will cause the appearance of a mist floating above the spray.

necessary to give proper distribution to the entire radius. Also, the specified radius will probably not be attained.

Adjustable full and part-circle nozzle's are also available to the designer. These nozzles feature an adjustment screw for regulating the spray radius. Adjustable nozzles normally are not available in coverage arcs considered special.

Many designers prefer the "fixed-orifice" or non-adjustable nozzle. Pipe-sizing is used to control volume and pressure to the heads. This method insures a "designed-in" balance of sprays throughout the system. This balance is maintained since unknowing persons can't change the flow characteristics of the nozzles with a screwdriver.

Spacing. Head spacings are a matter of choice, Although 20 foot triangular spacing has become more or less standard throughout the industry. There are occasions when a low static pressure or small water supply requires the use of closer spacing.

Each manufacturer provides spray nozzle performance tables indicating water pressure and flow required to obtain coverage. The specifications or tables will also recommend maximum head spacing. Maximum spacing is the distance the heads can be placed apart and still provide the necessary overlap of sprays required for good distribution. Spacing recommendations should never be exceeded. Also, it is cautioned that performance will vary from one manufacturer to another.

Construction. Although there are various popup spray head designs, only that configuration considered *standard* is discussed in this text. The *standard* head has a nozzle flange which seats into the body; see Figure 2. This type construction usually prevents dirt from falling into the head between the nozzle assembly and the body barrel. If dirt enters the head at this point, the pop-up action may be affected, and the resulting malfunction creates unnecessary service problems.

A well designed sprinkler head does not sacrifice material for economy at the expense of performance. There are certain minimum standards that should be met in product design.

The nozzle assembly (functional parts) must contain sufficient weight and clearance within the barrel of the body if it is to recede properly. Otherwise, the advantage of the pop-up is lost in failure

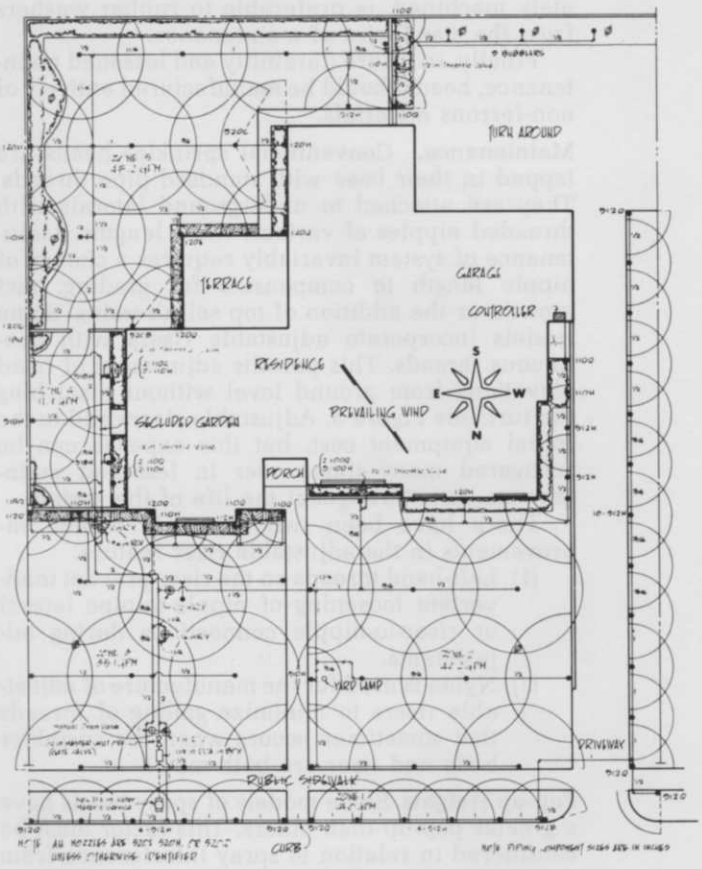

Figure 1: A layout of a residential spray system showing a variety of coverage patterns.

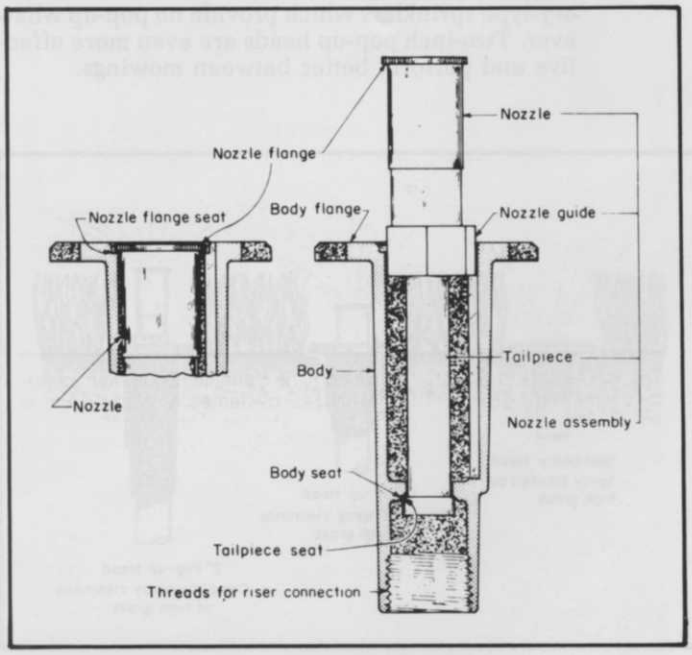

Figure 2: The standard pop-up spray head consists of a nozzle flange which seats into a body.

Sprinkler *from page 25*

to retract. Tailpieces should have an adequate cross-sectional area for passage of water to avoid a high pressure loss through it. If it does not, the head will require an abnormally high inlet pressure.

Direct body-to-tailpiece "seating," if accurately machined, is preferable to rubber washers from the standpoint of maintenance.

Finally, to insure durability and lessened maintenance, heads should be manufactured entirely of non-ferrous materials.

Maintenance. Conventional sprinkler heads are tapped in their base with standard pipe threads. They are attached to underground laterals with threaded nipples of various, fixed lengths. Maintenance of system invariably requires a change of nipple length to compensate for grading, turf growth, or the addition of top soil dressing. Some models incorporate adjustable risers with continuous threads. This permits adjustment of head elevations from ground level without disturbing the turf; see Figure 3. Adjustable risers add to the initial equipment cost, but this expense can be recovered many times over in lessened maintenance costs throughout the life of the system.

There have been two relatively recent improvements in the adjustable riser feature:

(1) Left-hand threads on the riser prevent inadvertent loosening of nipple-to-pipe lateral or riser-to-nipple connections during adjustments.

(2) Nylon is used for the manufacture of adjustable risers to minimize galling of threads that sometimes occurs when the sprinkler body and riser are both metal.

Pop-up Heights. Some models of spray heads have a greater pop-up than others. This factor must be considered in relation to spray interference from the grass.

The pop-up should not be less than one inch, as shown in Figure 4. Otherwise, the sprinkler would have no advantage over the obsolescent, stationary-type sprinklers which provide no pop-up whatever. Two-inch pop-up heads are even more effective and perform better between mowings.

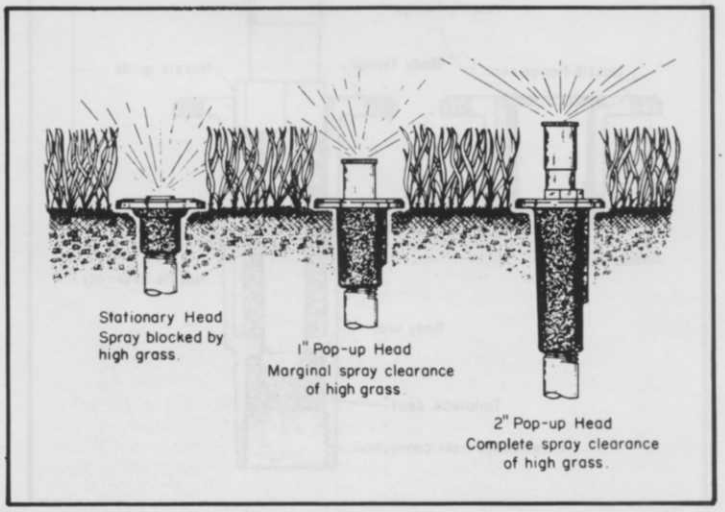
Stationary Head
Spray blocked by high grass.
1" Pop-up Head
Marginal spray clearance of high grass.
2" Pop-up Head
Complete spray clearance of high grass.

Figure 4: Pop-up height should be considered in relation to spray interference from the grass.

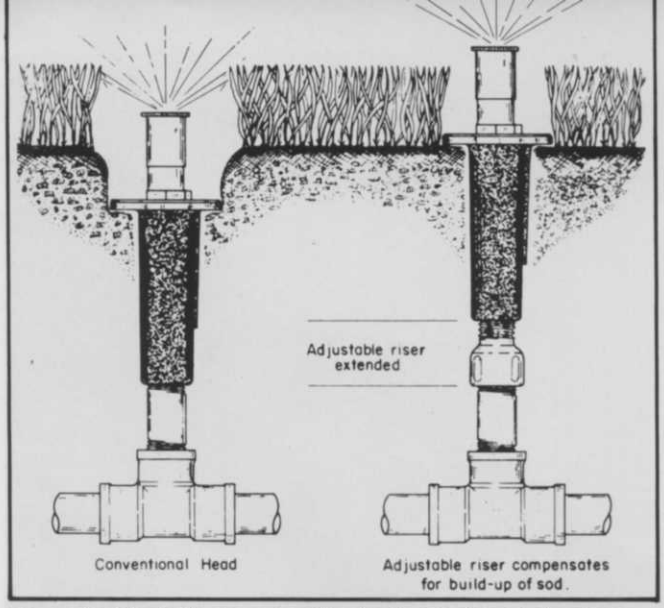

Figure 3: Adjustable risers permit adjustment of head elevation without disturbing the turf.

SHRUB HEADS. Spray heads designed for installation in or above shrubbery and flowers deliver water exactly the same as pop-up sprays. However, shrub heads are made to a much smaller configuration for aesthetic purposes.

Compatibility. The spray of shrub heads should be exactly compatible with pop-up head sprays. This is important because a great percentage of shrubbery can be sprinkled with the same amount of water required for the lawn areas. In these cases, system design can be simplified by blending the sprays of both type heads and operating them together. When systems can be designed this way, unnecessary costs for extra valved zones are avoided.

SPECIAL SPRAYS. A wide choice of spray nozzles and heads with special features is available to the designer.

Low Angle Sprays. Normal spray trajectory is about 30° to 40° above horizontal. Part circle sprays, for both pop-up and shrub heads, are available with a low-angle trajectory of about 10°. The low trajectory reduces the adverse effect of wind drift.

The low-angle shrub spray has proven to be especially beneficial. In fact, most systems installed to day use this feature. Shrub heads should never be installed more than 4 feet above grade in order to assure coverage under the head.

Part-circle, low-angle spray nozzles are sometimes used in pop-up heads. For example, alongside heavily-trafficked sidewalks to minimize the blowing of spray onto the pavement.

Strip Sprays. Spray nozzles for watering long, narrow strips of turf or plantings are available in several different types. These sprays, sometimes called "line" sprays, are generally designed to water 1 to 3 foot wide strips.

Stream Sprays. Some manufacturers offer a spray nozzle that disperses water over the rated coverage area with tiny streams. Generally, it is recommended that heads using stream nozzles be spaced so that streams from each head overlap adjacent heads. With such spacing the streams adequately "crosscross" to provide coverage between the streams. See Figure 5.

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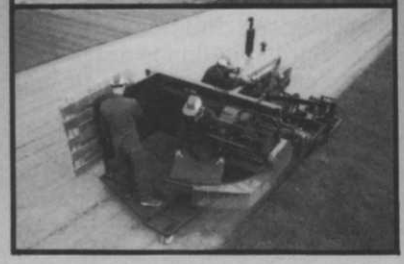

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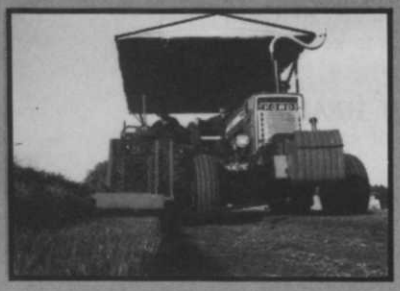

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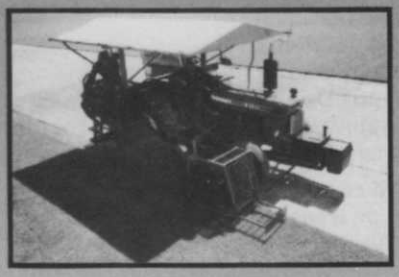

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Because of their low volume of discharge (and consequent lower rate of precipitation) the stream nozzles are often used on non-sodded banks and berms to minimize run-off and "wash." Also, they are sometimes used in rotary systems to water isolated areas. Because their precipitation rate is closer to that of rotary sprinklers than regular spray heads, they are often operated with the same zone valve.

Because of the very small orifices which form the streams, very clean water is required to avoid an abnormal amount of maintenance to keep these orifices clean.

SPECIAL SHRUB NOZZLES AND HEADS. To further aid the designer, a number of special purpose shrub heads are available.

Short Radii Nozzles. One widely used head is a partcircle spray which features (1) an extremely small radius of about 3 feet, (2) a relatively flat trajectory and (3) low water flow consumption. It can be used for watering "from above" in the normal manner; more often it is used for "flood watering" of narrow, confined areas such as planter boxes. Full-circle sprays available offer a minimum radius of about 6 feet. Head selection will range upward to coverages and flows similar to those available for regular spray heads.Designers may also choose trajectories from "below horizontal" to normal (30° to 40°), depending on model.

Deep Watering. Special heads are required for deep watering of individual shrubs or trees.

One type of special head for this purpose is known as a "Bubbler." It discharges water with an "oozing" effect and is adjustable from very low flows to relatively high flows.

Another type disperses water with small streams. These heads are known to the trade by such names as "spider" and "Jet Irrigator." At low

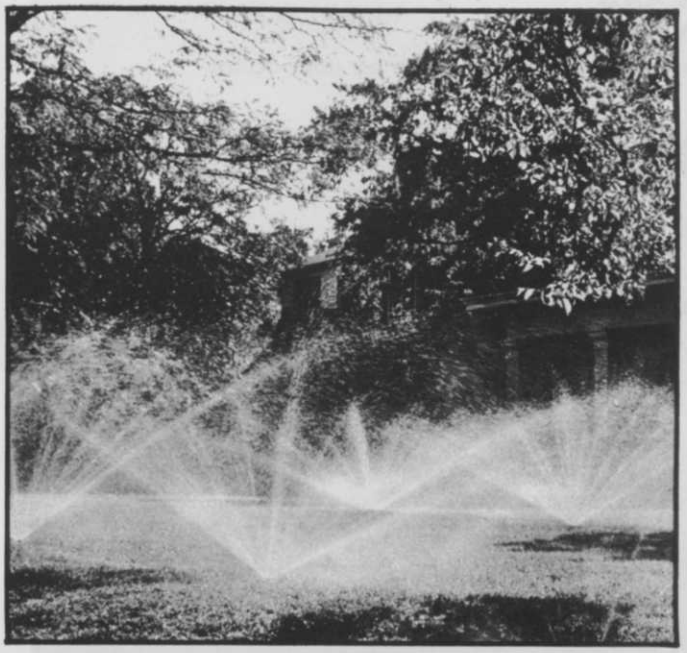

Figure 5: Stream spray nozzles should be spaced so that streams from one head overlap adjacent heads.

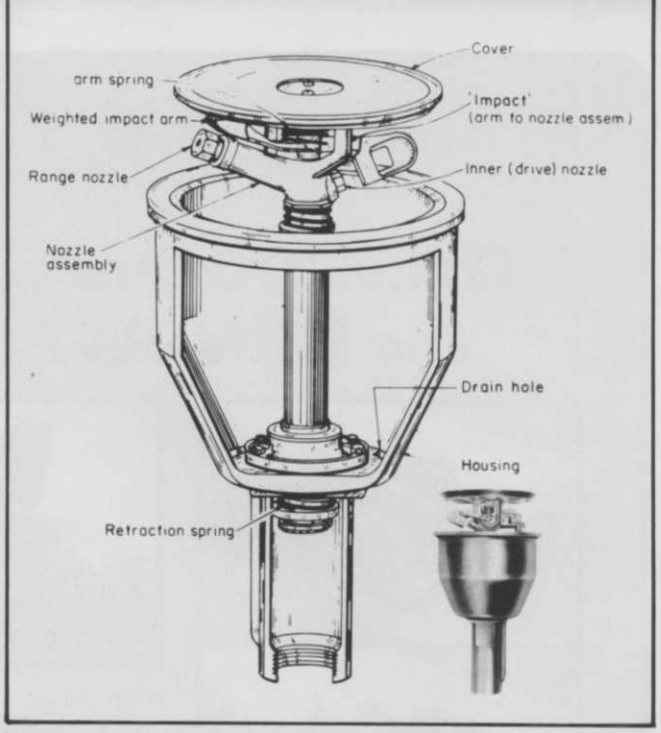

Figure 6: Impact drive rotary sprinklers are rotated by water impacting against a spring-loaded drive arm.

adjustment, the streams reach out only a foot or two, providing an extremely slow soaking action for close-located shrubs. At full-open, the adjustment provides slow precipitation to areas 6 to 8 feet diameter. These heads are available in both full-circle and part-circle models.

Nozzle Adapters. For design versatility, most manufacturers also provide special adapters for compact shrub-mounting of pop-up head nozzles. One pop-up nozzle commonly used in this manner is the "strip" or "line" spray nozzle described previously. This nozzle is excellent for watering narrow planting beds from "above."

EFFICIENCY. Spray systems precipitate water rapidly, at the rate of about one inch per hour; distribution is considered exceptionally uniform when system is properly designed. Since the rate of application is much greater than for other types of systems, the watering schedule can be accomplished in a much shorter period of time. And, since evaporational loss is in direct proportion to the length of operation time, spray systems unquestionably use less water. Automation can help reduce evaporation loss still further by facilitating watering at night. The percentage of water loss due to evaporation is considerably higher for daytime operation.

Watering at night should occur as near to dawn as possible for best results. Avoid evening watering if possible. When watering is done in the evening, the earth remains wet all night. And, overnight dampness provides ideal conditions for growth of moss, fungus, etc.

DESIGN CONSIDERATIONS. Spray systems are zoned and operated in sections or circuits sized to fit the existing water supply, or a new, larger service, if required. The number of heads per circuit is dependent on the flow requirements of each, and the capacity and pressure of the water supply. Thus, the smaller water supply will always

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necessitate more zones, or circuits, and increase the length of the watering cycle.

Ordinarily, it is impractical to operate all sprinklers in a system simultaneously. The combined flow might create too great a load on the city water main, or the cost of a large enough water service and meter might be prohibitive. On the other hand, too many circuits will prolong the length of watering time beyond reasonable limits. Therefore, if full utility of the system is to be realized, an adequate water supply must be provided in proportion to the property size.

COST FACTORS. The cost of a spray system will vary considerably with such factors as type of equipment, kind of piping, regional labor rates, quality of system design, etc. Due to the many variables, there is no single yardstick that can be applied to cost estimations. For example, a corner lot will cost more than an inside lot of the same size because a greater number of part-circle sprinklers will be needed for perimeter watering.

Part-circle spray heads cost approximately the same amount as full-circles, installed. Therefore, a ½-circle spray head will cost twice as much as a full-circle in relation to the amount of area watered. A ¼-circle would cost four times as much, etc.

Pipe and fittings, which serve as a framework for the system, and labor comprise about 65% of the overall cost. Labor is largely a fixed cost (subject only to the economies that may be realized from efficiency and mechanization). The cost of pipe and fittings will naturally change with the grade of material specified.

The remaining 35% of the cost is made up of sprinkler equipment consisting of heads, control valves, automatic controllers and accessories. Trying to seek savings on sprinkler equipment can very well lead to false economy when realizing that the cheapest equipment can be expected to meet minimum standards of performance, at best. On the other hand, the finest equipment obtainable adds only a nominal amount to the initial cost while offering optimum results with less maintenance expense.

Nozzle	Operating Pressure psi	†Spacing (ft.) Δ	□	Flow gpm	Diameter Coverage ft	Δ ††Precip in/hr
E12 x A11	50	66	61	12.5	102	.31
3/16 x	60	68	63	13.8	105	.33
11/64	70	69	64	15.1	107	.35
	80	71	66	16.4	110	.36
	90	72	67	17.8	112	.38
E13 x A11	50	71	66	15.0	110	.33
13/64 x	60	73	67	16.4	113	.34
11/64	70	76	70	17.8	117	.34
	80	78	72	19.0	120	.34
	90	79	73	20.2	122	.36
E14 x A11	50	74	68	16.2	114	.32
7/32 x	60	78	72	17.5	120	.32
11/64	70	79	73	18.8	123	.33
	80	81	75	20.1	126	.34
	90	81	75	21.5	126	.36
E16 x A11	50	75	69	19.0	116	.37
1/4 x	60	79	73	20.3	122	.37
11/64	70	81	75	21.7	126	.37
	80	83	77	23.0	129	.37
	90	83	77	24.3	129	.39

Table 1. Typical Rotary Sprinkler Performance Table

ROTARY SYSTEMS

Because of their intermediate cost, rotary systems are quite popular for sizeable projects such as large urban home lots and estates, parks, schools, playgrounds, golf courses, public buildings, factories and offices. The area must be large and generally less confined by sidewalks, buildings, etc., since rotary systems are not as flexible as spray systems.

Rotary sprinklers utilize slowly-rotating, high-velocity streams to distribute water over relatively large circular or semi-circular areas. Depending on the model of sprinkler, one to several streams are used. Coverages range from about 40 feet to over 200 feet in diameter.

ROTARY SPRINKLER HEADS

Rotary heads, like spray heads used in turfgrass areas, are pop-up with the head being completely concealed in the ground except for the coverplate, which is exposed at ground level. The nozzle portion pops-up to sprinkle and recedes within the sprinkler housing when inoperative.

During operation, water under pressure flowing through the heads drives any one of several types of mechanisms to rotate the nozzle assembly. Rotary head drives are named to describe the basic component providing the rotational drive force. Most well-known are the "impact" drive and "gear" drive, which are described in the following text along with other mechanism types in use today.

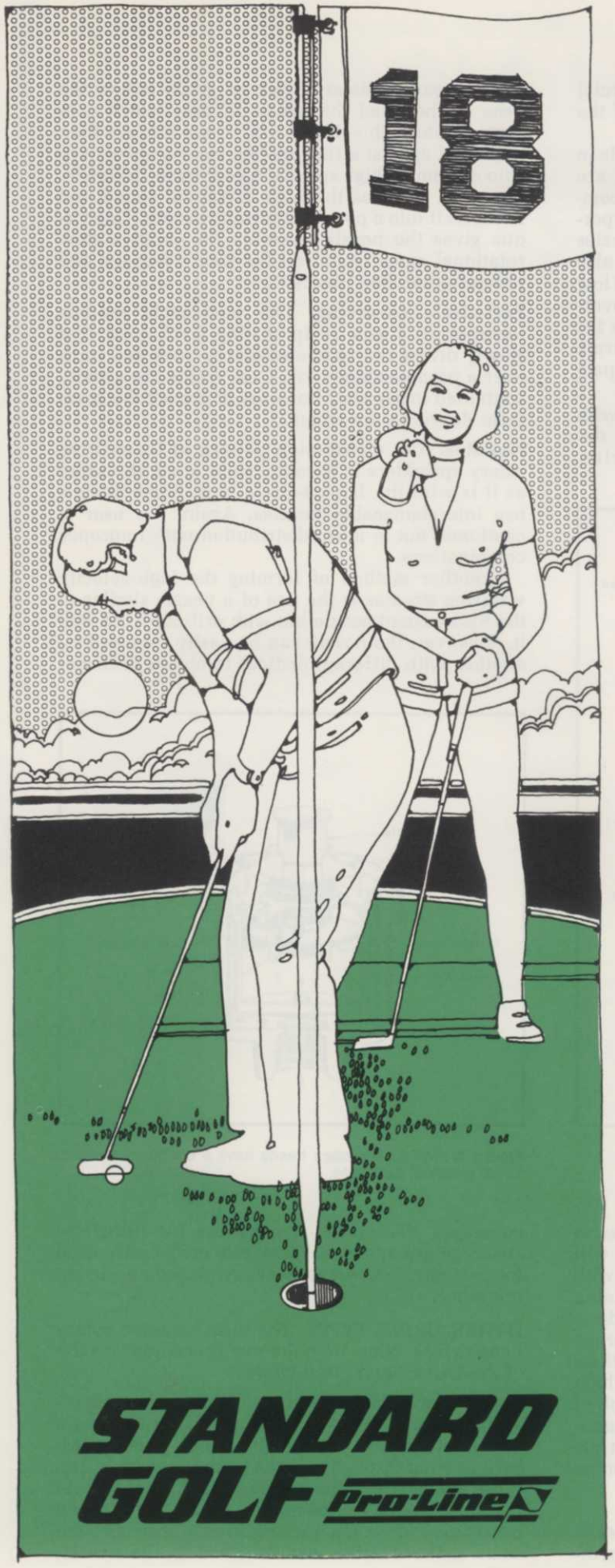
IMPACT DRIVE ROTARY HEADS. The impact drive rotary sprinkler employs a weighted, spring-loaded drive arm to provide the force to rotate the nozzle assembly. The sprinkling stream deflects the arm sideways and the spring pulls the arm back to the nozzle assembly and into the path of the stream. As the drive arm completes each swing cycle it impacts against the nozzle assembly rotating it slightly. See Figure 6. Most models of this type of sprinkler are available in both full-circle and part-circle.

Adjustable arcs. Part-circles are infinitely adjustable for degree of arc to be watered. Adjustment, depending on model, can be as much as from 20° to 340°. Some models are known as "combination" sprinklers because disengagement of the trip-pin of the reversing mechanism converts a part-circle to a full-circle.

Nozzling. Full-circle, pop-up impact sprinklers generally utilize two opposed nozzles; a "range" nozzle and an "inner" nozzle which make possible larger diameters of coverage. Long streams can't provide "breakup" of the stream into the small water droplets required to give distribution for the entire length. So, the "range" nozzle provides distribution at the outer areas of coverage diameter. And, the "inner" nozzle provides the distribution from the head to where the "range" nozzle begins its distribution.

Part-circle impacts also utilize two nozzles. However, the nozzles both face the same direction.

Only one nozzle is utilized on some smaller im-



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pact rotaries (both full-circle and part-circle) where the coverage falls within the range of the "inner" nozzles previously described.

Most brands of impact rotary heads are made in several different physical sizes. The nozzles are changeable, thus allowing each model to accommodate several different orifice sizes. It is important to note that while different size nozzles provide varying coverage diameters, each size also requires different water pressures and flow volumes to operate correctly. There is some overlap in the capabilities of various nozzles. Table 1 is a typical data table. It is included to demonstrate the varying performance of nozzles in impact rotary sprinklers.

To accomplish the distribution pattern with two-nozzle sprinklers the manufacturer determines the best combination of nozzles.

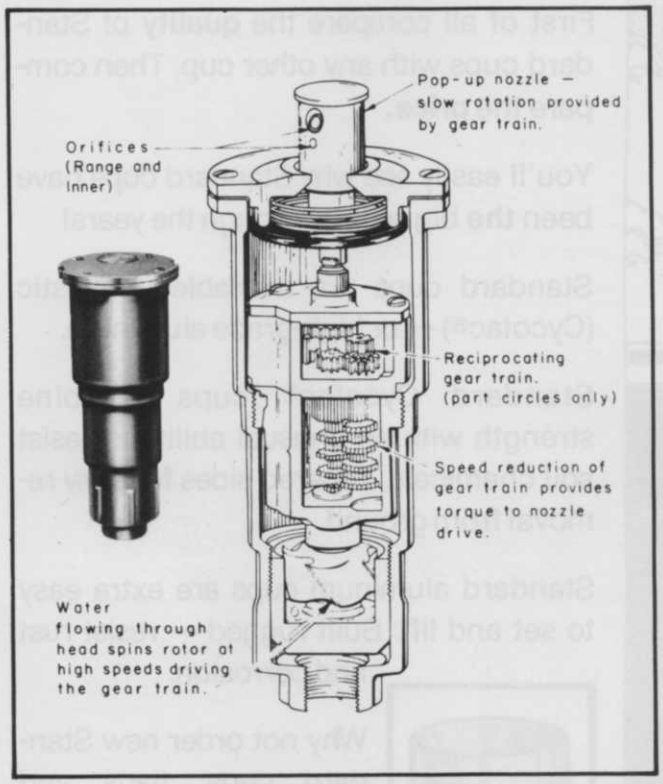
Pop-up nozzle — slow rotation provided by gear train.
Orifices (Range and Inner)
Reciprocating gear train. (part circles only)
Speed reduction of gear train provides torque to nozzle drive.
Water flowing through head spins rotor at high speeds driving the gear train.

Figure 7: Gear-Drive heads provide a steady rotation and good coverage.

Caution should be used when changing nozzles in the field. Incorrect nozzle combinations will upset the distribution, resulting in areas with deficient coverage. Some nozzles are available with an adjustable "diffuser-pin" to provide a means of changing the distribution and coverage within reasonable limits. Two other cautions should be noted: (1) Use nozzle sizes for which water pressure and flow volume can be supplied according to the recommendations of the manufacturer. (2) Design in accordance with performance table minimum *and* maximum pressures beyond which a nozzle should not be used.

GEAR-DRIVE HEADS. Gear drive rotary heads provide a steady, powerful rotation to the sprinkling streams. Water under pressure enters the base of the head through a diffuser which converts it into high velocity jets. These jets are then impinged against a turbine-like rotor causing it to spin extremely high speeds. A gear train, driven by the rotor, reduces the high rotational speed and converts it into a powerful turning torque. This torque gives the nozzle-assembly the relative slow rotational speed required for good coverage and precipitation. See Figure 7.

Part-circle reversing. The part-circle models incorporate a gear reciprocating mechanism that slowly drives the nozzle-assembly back and forth over a predetermined arc. Gear trains are usually contained in separate housings to protect the gears from debris in the water.

Nozzling. The distribution pattern of Gear-Drive rotary sprinklers is accomplished much the same as it is with the Impact-Drive type. Some models use interchangeable nozzles. Again, the user is cautioned not to upset distribution with improper combinations.

Another method of forming the high-velocity watering streams is the use of a nozzle similar to the Spray Head nozzle but with orifices fixed into it. However, the nozzle can be easily replaced by another with different orifices to obtain different

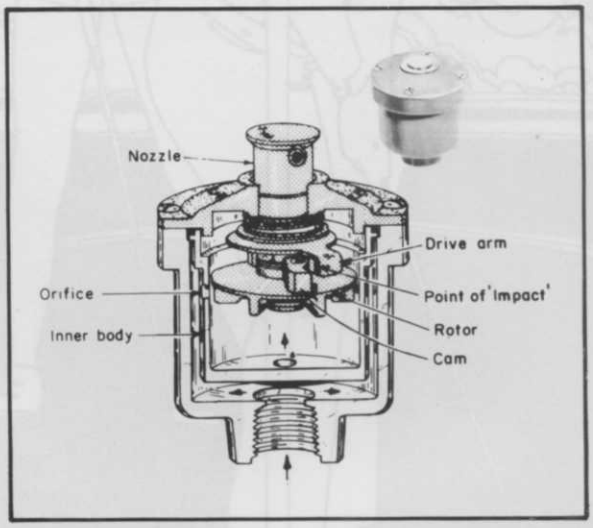

Figure 8: Cam-Drive rotary heads have a continuous rotation for all practical purposes.

coverages. Generally, the orifices for full-circle coverage are opposed. When two orifices are used for part-circle coverage, they are placed one above the other.

OTHER DRIVE TYPES. The most common rotary head drives, other than the two preceding, are the "Cam-Drive" and "Ball-Drive."

Cam-Drive Rotaries. Figure 8 illustrates a rotary sprinkler employing cams mounted directly on a rotor. Jet-streams, formed by water under pressure passing through orifices in an inner body, impinge against the rotor spinning it at high speed. As the rotor spins, the cams are swung outward by centrifugal force. On each rotation of the rotor, the cams strike a drive arm attached to the nozzle,

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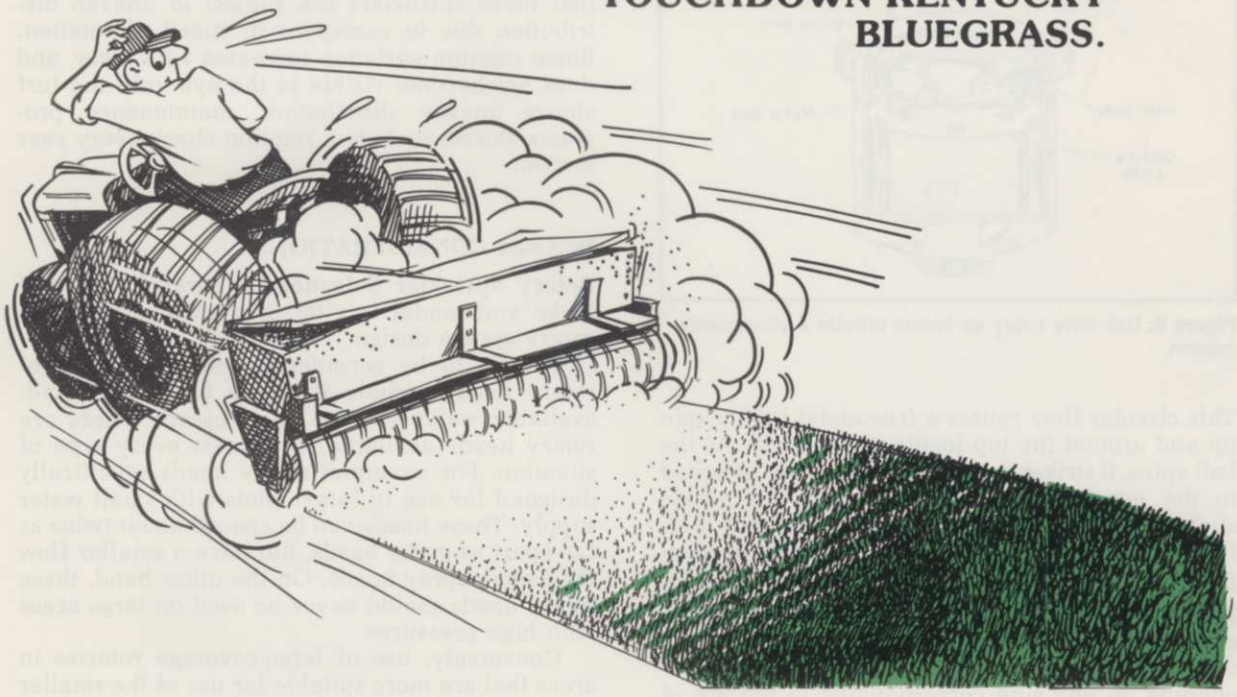

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Sprinkler *from page 32*

causing a slight rotation. Upon impact, the cams swing inward instantaneously to pass the drive arm. Because of the high speed of rotor rotation and the number of cams, nozzle rotation is continuous for all practical purposes.

Ball-Drive Rotaries. Figure 9 illustrates a sprinkler utilizing a spinning metal ball to provide the power to rotate the nozzle. Water under pressure enters the head through a plate with angular openings located in the base of the head. This action causes the water to spin at high circular velocity.

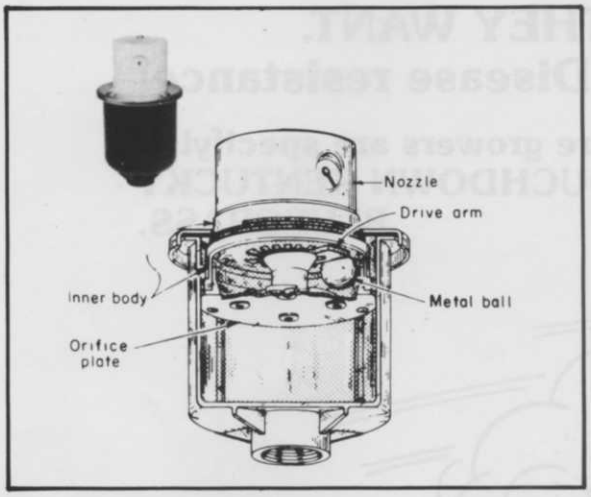


Figure 9: Ball-drive rotary sprinklers provide a slow steady rotation.

This circular flow causes a free metal ball to spin up and around the top inside of the body. As the ball spins, it strikes a projecting drive arm attached to the nozzle. Each impact rotates the nozzle slightly. The impacts occur so rapidly that, in effect, a slow, steady, rotation is seemingly accomplished.

Part-circles. Many cam and ball-drive sprinklers employ a hood over and around the nozzle to provide part-circle coverage. The hood has a milled-opening on one side corresponding to the arc of coverage. During nozzle rotation, the sprinkling streams are "blocked-out" as they enter the unmilled portion of the hood. The running clearance between the hood and nozzle can cause some degree of puddling near the head.

EFFICIENCY. The water distribution of rotary systems is not as good as with spray systems because even the slightest breeze will bend or whip the long streams. For this reason, additional compensation must be made for the velocity and direction of the prevailing wind in each locale. Since this condition becomes more acute with the longer range heads, the trend is toward closer spacing and shorter throw.

Most designers, today, agree that 65 ft to 75 ft spacing is the most effective and economical for large areas; even for golf course. Aside from better performance, as compared to larger spacings requiring greater diameters of coverage, these medium spacings offer some cost advantage. The decreased flow and pressure requirements for smaller heads permit smaller piping and greater zone flows. An added advantage is that the smaller coverage heads have a slower precipitation rate.

Since the precipitation rate of rotary systems averages only 1/5 to 1/3 of spray systems, the time required to provide the same amount of irrigation will average about four times longer.

The longer watering schedule and resultant evaporation losses associated with slower precipitation, plus a less even distribution of moisture, would seem to make rotary systems somewhat less desirable. However, the economy to be realized on projects involving acreage minimizes these deficiencies to a large extent. Other factors also minimize these deficiencies: (1) night watering reduces evaporation, and (2) effects of wind on coverage are reduced with longer watering periods because, in most locales, wind varies in velocity and direction constantly.

Christian, in his bulletin on extensive research of impact rotary sprinkler precipitation, reported that these sprinklers are subject to uneven distribution due to variations in speed of rotation. Since rotation variation increases with wear, and does not become visible to the eye until the turf shows uneven distribution, maintenance programs should include a rotation check every year or two.

DESIGN CONSIDERATIONS

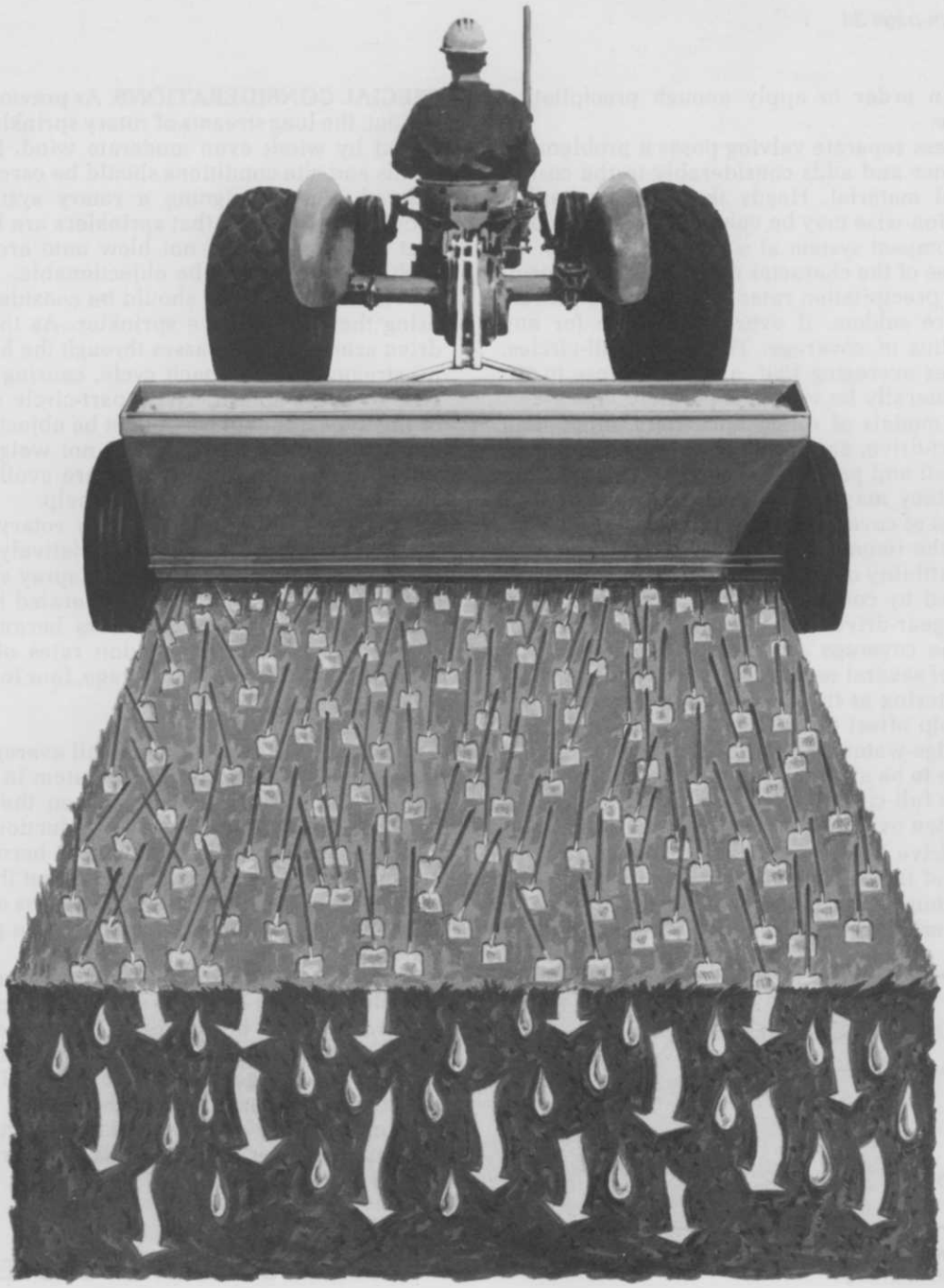
Rotary Sprinkler Selection. A careful choice of make and model is vital to a good, economical rotary system design.

Factors to be considered before selection of rotary heads include the area to be sprinkled; available water volume and pressure. There are rotary heads available for almost every type of situation. For example: rotary heads specifically designed for use in larger plots with small water supply. These heads can be spaced about twice as far apart as spray heads, but have a smaller flow than some spray heads. On the other hand, these rotary heads should never be used on large areas with high pressures.

Conversely, use of large-coverage rotaries in areas that are more suitable for use of the smaller coverage heads, even though the water supply is adequate, will result in a totally undesirable system. With bordered areas, due to overlap required, water waste usually increases as the sprinkler diameter of coverage increases.

Zoning. Pop-up rotary systems, like spray systems, are valved and operated in zones, or sections. This procedure avoids overloading the water supply. Again, the number of heads in each zone depends on the volume of water available and the pressure.

Precipitation. The full and part-circle rotary heads of many models are not balanced to provide uniform rates of precipitation. For example, some have the same nozzle orifices for full and fractional circles. Consequently, quarter-circle heads will apply twice as much water as half-circles and four times as much as the circular ones; half-circles will apply twice as much as circular heads. Obviously, each type (full, halves and quarters) must be valved separately from the other types in this case. Otherwise, certain areas will have to be



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CHEMICALS DIVISION
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Sprinkler *from page 34*

flooded in order to apply enough precipitation elsewhere.

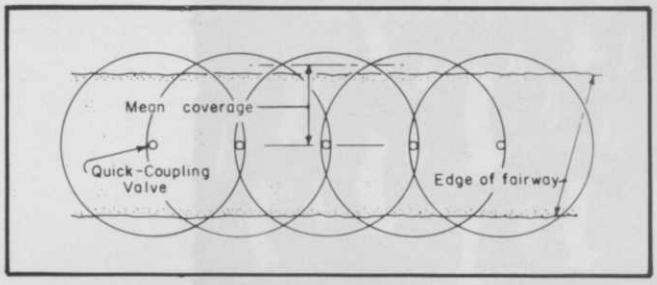
Needless separate valving poses a problem for the designer and adds considerably to the cost of labor and material. Heads that are compatible precipitation-wise may be valved together, making a more compact system at substantial savings.

Because of the character of impact rotary sprinklers, the precipitation rates of full and part-circle models are seldom, if ever, compatible for any given radius of coverage. Therefore, full-circles, part-circles averaging 180°, and those close to 90° should generally be valved separately.

Many models of rotary sprinklers, other than the impact-drive, are available with precipitation rates of full and part-circles compatible to the extent that they may be valved together. However, their areas of coverage are usually limited as compared to the impact sprinklers.

Compatibility of precipitation cannot always be determined by comparing flows. For example: at least one gear-driven rotary has a "dwell" at each end of the coverage arc built in the head. This "dwell," of several seconds, provides needed additional watering at the edges of the coverage pattern to help offset the effects of wind. This additional "edge-watering" causes the flow rate of a half-circle to be about more than one-half the flow rate of the full-circle. However, tests show that the precipitation over the watered area is compatible.

Gear-drive heads which provide a "dwell" at each end of the coverage arc, and compatibility of precipitation and pressure requirements between full and part-circle models, are favored for irrigating parks, school grounds, etc. This is particularly true when pressure requirements of the sprinklers enable operation with city water supply without the need of booster pumps.



Quick-coupling systems in fairways should be spaced to spray head to head for adequate coverage.

Caution. Before valving different types of sprinklers together, consider pressure requirements in addition to precipitation rates. For example: even though two sprinklers have the same precipitation rate, one may require 35 lb/in² water pressure at the base of the head while the other requires 60 lb/in². Obviously, a piping system cannot be designed to handle this disparity.

Spacings. Coverage ratings and spacing are generally given for still air which must be derated to compensate for prevailing winds in the locale of the system. A *standard formula for spacing deration is not feasible because of the varying stream characteristics of different sprinklers.* Use recommendations provided by each manufacturer for his equipment.

SPECIAL CONSIDERATIONS. As previously pointed out, the long streams of rotary sprinklers are affected by wind; even moderate wind. Prevailing winds and site conditions should be carefully considered when designing a rotary system. Care should be exercised that sprinklers are located so that the streams will not blow onto areas where such watering would be objectionable.

This same concern should be considered when using the impact drive sprinkler. As the impact-drive arm swings, it passes through the high-velocity stream twice on each cycle, causing some degree of "back-splash." With part-circle sprinklers of this type, the "splash" might be objectionable if placement of the sprinklers is not weighed carefully. Some heads of this type are available with anti-back-splash devices which help.

It should be noted that with rotary systems, there are almost always some relatively confined areas that must be watered with spray sprinklers. The spray sprinklers must be operated independently from the rotary sprinklers because of the large variance in precipitation rates of the two types of sprinklers; on an average, four to one.

COST FACTORS

The cost of a rotary system will average 50 to 70 percent of the cost of a spray system in the same property. The differential between the two systems tends to diminish with a reduction of area, and increases as the sprinkled area becomes larger. The principal reason for this is that the ratio of part-circle to full-circle heads increases as the property becomes smaller, requiring more perimeter watering.

Unlike spray heads, the unit material cost for part-circle rotary heads is somewhat greater than for circular ones; however, the area of coverage is only one half as large in the case of half heads and one-fourth as large for quarter heads. Therefore, the cost per square foot of coverage is considerably more than two times greater for half heads and four times for quarter heads. These ratios may vary with model.

QUICK-COUPLING SYSTEMS

While the least expensive quick-coupling systems are no longer being installed to any extent. In the past, they have been used primarily in golf courses, large parks and other extremely large properties, when lowest initial cost was the principal consideration. Many of these systems, particularly in golf courses, are being converted to automatic rotary systems.

However, the components of these systems are still used frequently in conjunction with spray or rotary systems.

(1) As a temporary means of watering areas in which it is not economical to install a regular system; such as areas to be redeveloped at a later date, etc.

(2) On pressure mains of a system to provide water for a myriad of uses other than normal sprinkling. For instance, deep-watering newly-planted trees.

Continues on page 69

WT&T

PROFILE

THE LANDSCAPE CONTRACTOR MARKET

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LANDSCAPE CONTRACTOR MARKET STATISTICS

To get a handle on the statistics of the landscape contractor market, WEEDS TREES & TURF randomly surveyed its readership in this profession.

According to John S. Shaw, executive director of the Associated Landscape Contractors of America, there are 5,000 to 7,000 bona-fide landscape contracting firms in the United States. The magazine has 4,700 landscape contractors in its circulation. We sent questionnaires to 1,000 of them and 144 were returned. This represents approximately three percent of the market, a statistically significant percentage.

The sample firms' answers indicate slightly more emphasis toward construction as opposed to maintenance. Construction with trees and ornamentals exceeds that with turf. Maintenance, however, is predominantly in the turf area. The percentage of firms doing design is below the percentage of firms doing construction types of landscaping.

Residential work makes up an average of 65 percent of business for landscape contractors according to the survey. Commercial jobs account for an average of 28 percent. Fifty-three percent of the respondents do an average of 25 percent of their business with general contractors or developers. Only four percent indicated involvement in land reclamation.

Correlating the type of work done with whom it is done for indicates the dominant kind of work done by landscape contractors is residential construction.

The vast majority (87 percent) own their equipment. Nine percent said they lease some of their equipment. Landscape contractors spend an average of $10,585 for equipment in a year. Projected to the total number of contractors in the circulation, a total expenditure for the industry of $49,000,000 is derived.

The number of pieces of various types of equipment based upon survey returns indicates the importance of the landscape industry to equipment manufacturers. The most commonly owned types of equipment are pick-up and dump trucks, tractors, rototillers, tractor mowers, manual (trim) mowers, and aerators. A third of the respondents own a backhoe. Approximately one out of five firms own hydromulchers, sod harvesters, and fork lifts. Roughly a tenth own flat-bed trucks, trenchers, bulldozers, and tree spades.

Equipment buying takes place primarily in the months of January through March.

Chemical expenditures averaged

Percentage of landscape contractors performing various services.

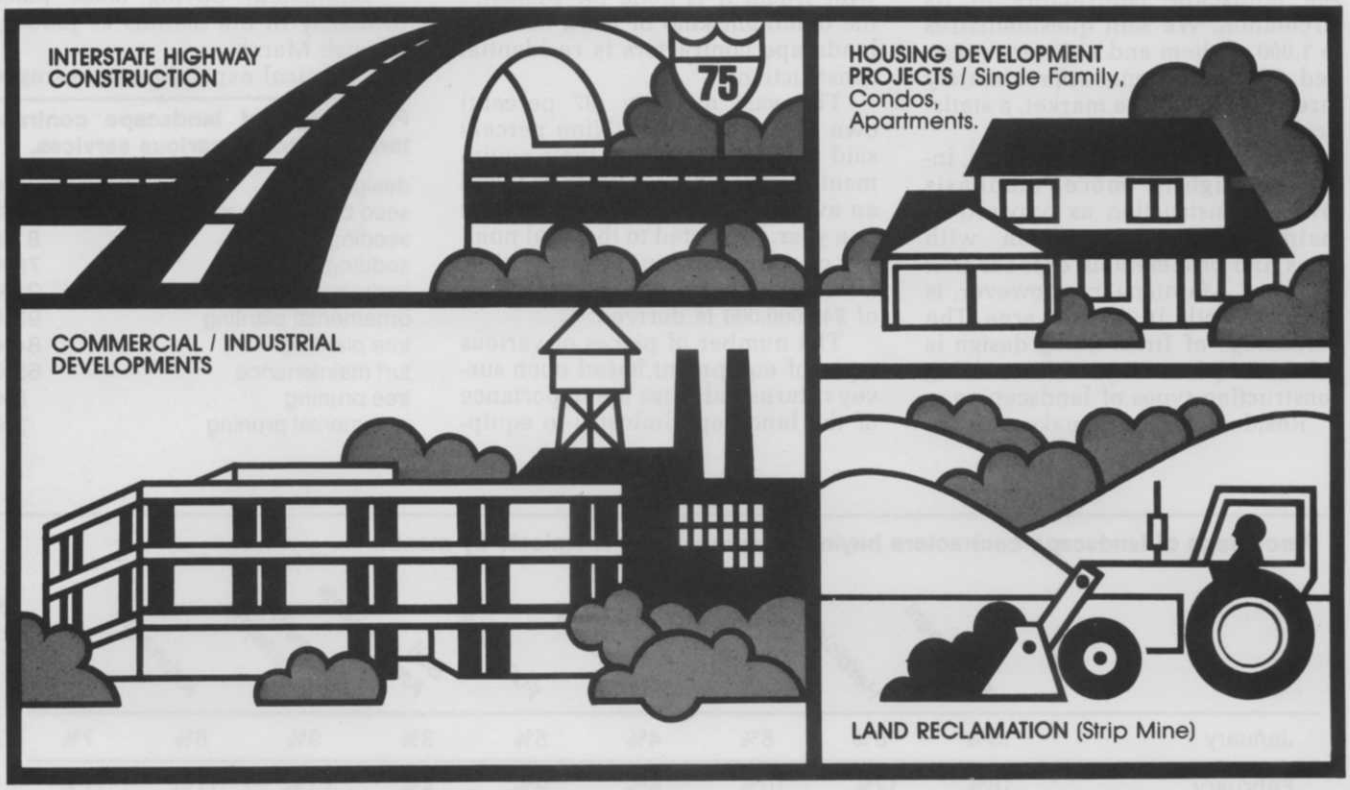
design	76%
seed bed preparation	64%
seeding	81%
sodding	78%
hydromulching	21%
ornamental planting	90%
tree planting	84%
turf maintenance	63%
tree pruning	8%
ornamental pruning	3%

Percentage of landscape contractors buying equipment and chemicals by month.

	Equipment	Herbicides	Fertilizer	Insecticide	Fungicide	Soil Amendments	Growth Regulators	Adjuvants	Surfactants
January	13%	6%	6%	4%	5%	3%	9%	8%	7%
February	18%	12%	10%	8%	9%	4%	13%	17%	17%
March	21%	23%	18%	21%	20%	16%	22%	29%	24%
April	9%	14%	14%	18%	16%	18%	13%	17%	17%
May	6%	13%	7%	10%	14%	11%	9%	17%	14%
June	4%	6%	7%	9%	8%	9%	13%	4%	3%
July	6%	5%	4%	9%	8%	7%	4%	0%	3%
August	5%	7%	9%	8%	9%	8%	0%	0%	0%
September	6%	8%	11%	4%	5%	13%	4%	4%	3%
October	3%	4%	7%	4%	3%	7%	4%	0%	0%
November	3%	3%	5%	2%	2%	4%	4%	4%	7%
December	5%	1%	1%	1%	1%	0%	4%	0%	3%

Watch For These Profiles In Coming Issues

Nursery Wholesaler — May
Land Reclamation — June
Athletic Fields — July
Sod Producer — August
Parks — October
Cemetery — November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			John Sandford	Bob Mierow

$3,744 per year per firm, with a total market figure of $17,400,000 based upon 4,700 firms. Most chemical buying takes place in March. However, a significant amount of chemical buying occurs in April, May and September. Chemical buying is not as winter-oriented as is equipment buying.

The median number of full-time landscape staff members was three. The median number of seasonal or part-time workers was six.

The annual gross revenue of contractors responding was $173,718, with a median figure of $100,000. Projecting the average to the magazine's qualified circulation in the market provided a total revenue figure of $800,000,000. Projecting total market revenue using 7,000 firms gave a figure of $1,216,026,000.

When asked what they charged for various services the following rates were obtained:

sod—average 27¢/sq. ft., median 25¢/sq. ft.

seeding—average $71/1000 sq. ft., median $50/1000 sq. ft.

hydromulching — average $52/1000 sq. ft., median $40/1000 sq. ft.

Aerating — average $19.50/1000 sq. ft., median $11/1000 sq. ft.

Advertising expenditures are greatly centered around Yellow Page advertising. Eighty-four percent of the respondents use the Yellow Pages at an average cost of $900 per year. More than half advertise in newspapers at an average annual cost of $1,200 and a median cost of $300. Direct mail and brochures are used by a fifth or more of the respondents. The average spent for direct mail was $1,000, with a median of $500. Brochures cost an average of $500, with a median of $200 per year. Other types of advertising used are radio (10 percent spending an average of $1,200), television (4 percent), and trade journals (7 percent for an average of $275). Seventeen percent indicated costs of selling in person for an average of $1,100 and a median of $500.

The respondents to the survey have a good feeling about the coming year. Nearly three-fourths expect an increase in business this year. Seventy percent reported gains averaging more than 20 percent in 1977. **WTT**

Amount of equipment owned by landscape contractors.

Type of Equipment	% who own this type	projected # of pieces owned by 4660 contractors	projected # of pieces owned by 7000 contractors
aerator	41%	2960	4470
backhoe	35%	2320	3500
bulldozer	12%	920	1390
cultivating disks	26%	1800	2720
fork lifts	16%	760	1150
hydromulcher	18%	1120	1690
tractor mowers	59%	5970	9010
manual mowers	75%	25,700	38,800
rototiller	70%	6090	9190
sod harvester	17%	1200	1810
pick-up truck	84%	8770	13,200
dump truck	76%	7490	11,300
flat-bed truck	9%	1040	1570
tree spade	13%	840	1270
trenchers	12%	720	1090
tractors	57%	6130	9250

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Model 451/452 PTO Mist Blower; lightweight; 3-pt hitch to 15-hp or over tractor; 53-105-gal. formula tank

TRAC-419 Mist Blower; self-contained module; mountable on truck bed, trailer, jeep, small tractor; 12.5-hp engine; adaptable to any size formula tank or tanker

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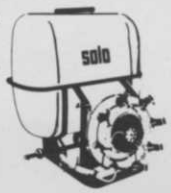

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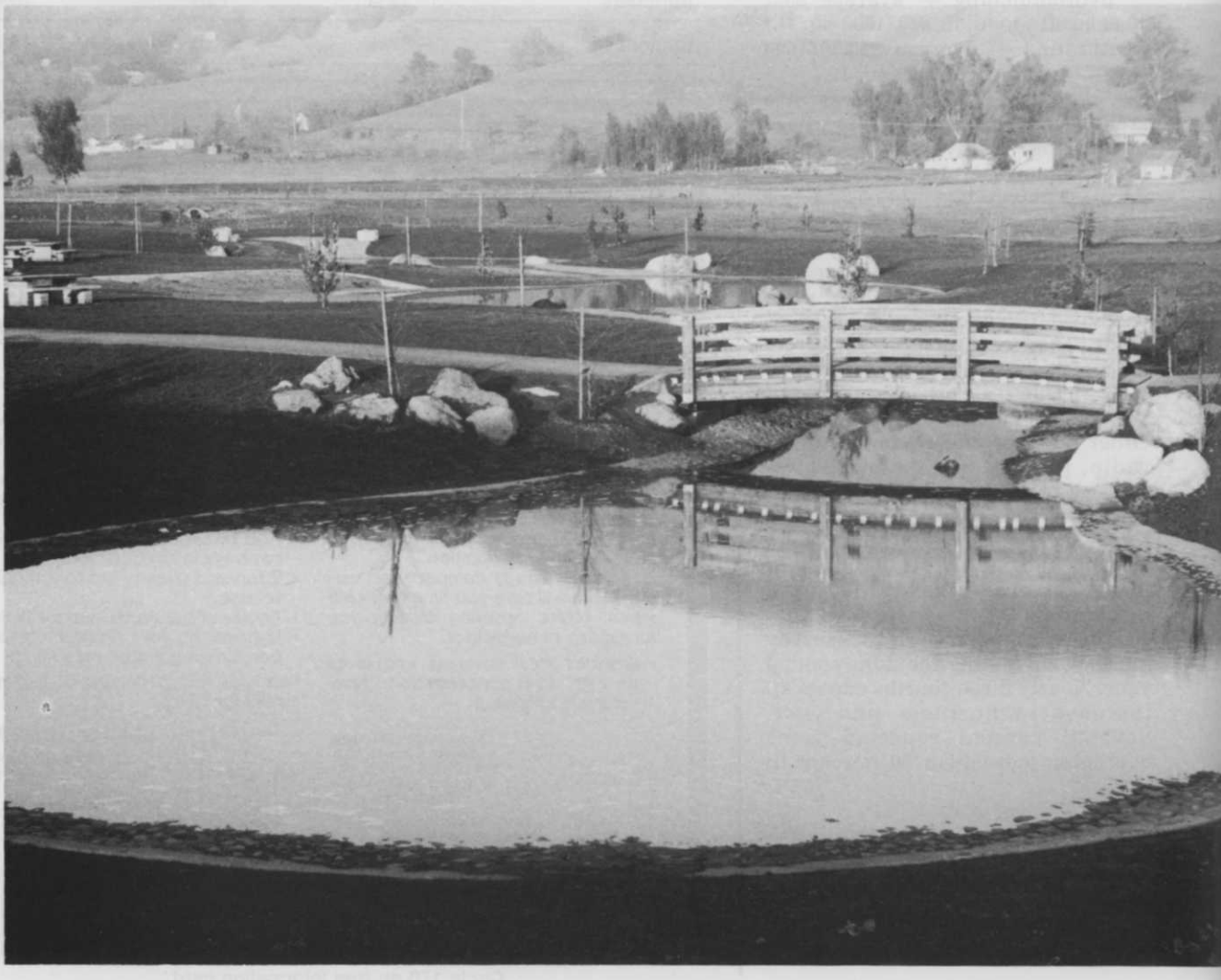
CONTRA COSTA: GENERAL LANDSCAPING AND HYDROSEEDING

Landscape contractors in the Oakland/San Francisco area have contended with drought for nearly three years. Until recently, lack of rainfall placed a damper on business, but Ken Gerlack (CLCA), president of Contra Costa Landscaping Inc., in Martinez, discovered some relief by being one of three Bay Area contractors offering hydroseeding for erosion control.

The rain finally returned this winter and Gerlack, and vice president Burt Harrington anticipate a boom this spring.

Contra Costa depends primarily on commercial construction and maintenance for its $750,000 business volume. Nearly 90 percent of construction is derived from bidding on public and private work. Currently, construction represents 40 percent of gross revenue, maintenance 35 percent, and hydroseeding the remaining 25 percent. Mainte-

Athletic fields and park areas are two specialties for Contra Costa.



nance business should jump with favorable growing conditions this year.

Gerlack and his permanent staff of 12 keep tabs on new construction by subscribing to a local construction newspaper and participating in the local builders' exchange. Since most work is based on architectural specifications, only a small amount of design work is necessary.

Contra Costa's seasonal staff numbers 25 from March through October. During the off season, Gerlack does much of the hydroseeding work to maintain a healthy cash flow.

In the Bay Area, exposed soil from any type of construction is highly subject to erosion since the topography is hilly and the rainfall great. Consequently, the revegetation market is larger than normal and hydroseeding is playing an increasingly significant role in it.

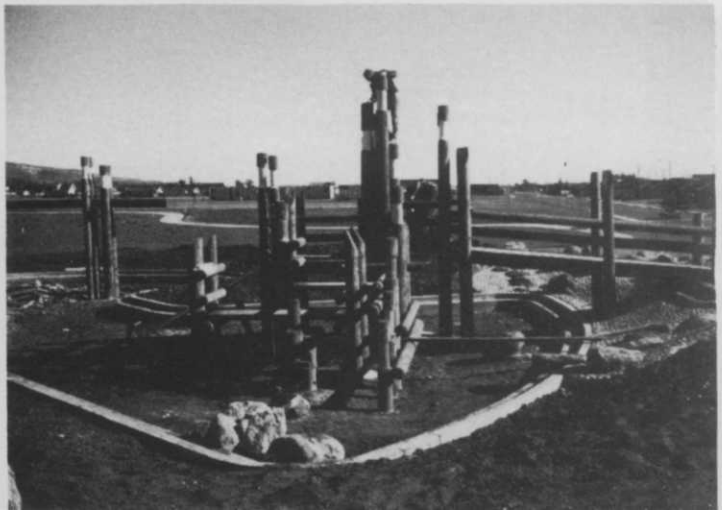
Contra Costa does relatively little residential work, primarily large estates. The Bay Area is one of the last holdouts of the estate gardener. There are a significant number of very wealthy homeowners in the San Francisco area who invest more than $200,000 in a home. A small percentage of these still have full-time gardeners and many have part-time gardeners.

Another factor is the large number of uncertified, generally untrained individuals who, because they are enamored by outdoor occupations, are willing to do basic maintenance chores at below standard rates.

Types of work subcontracted out by Gerlack are large earth moving, much of the irrigation and drainage installation, and structural jobs such as construction of patios, decks, sidewalks, and fences.

The company has not experi-

Playground equipment should be a part of the park, not just structures placed there. Here are a few od Contra Costa creations.



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- Less pounds last longer!
- Gets most tough weeds and most brush others leave behind!
- Gets most tenacious vines, brambles and woody plants!
- Is remarkably resistant to leaching and lateral movement!

Acceptability!

For the past several years, SPIKE has been tested in actual field situations with commercial equipment. When applied in accordance with label directions, SPIKE will result in a high level of long lasting total vegetation control.

Test plot demonstrates dramatic result of single application of SPIKE. ▶

Durability!

Commercial field use has demonstrated that at recommended application rates SPIKE remains effective longer than most other products tested, and permits lower application rates in succeeding years. Long-term control prevents regrowth for extended periods of time.

Missouri test plot treated with SPIKE shows residual control 2 years later! ▶

Capability!

Five years of development and more than three years of extensive nationwide on-site testing in non-crop areas have proven SPIKE highly effective in the control of a wide spectrum of vegetation, including many of the so-called hard-to-control species. SPIKE effectively controls many tough perennials, as well as many woody brush and vine-type species that escape other control products.

Dead common mullein along right-of-way is a dramatic example of SPIKE's effectiveness on tough-to-control species.

Commercially-applied test plot demonstrates SPIKE's ability to eliminate persistent varieties such as Bouncing Bet.

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- Less pounds last longer
- Gets most tough to control weeds and brush
- Gets most tenacious woody vines and brambles
- Is remarkably resistant to leaching and lateral movement

. . SPIKE belongs in your total vegetation program.

"Before" and "after" views of the same test plot clearly demonstrate SPIKE's ability to control brush and woody vegetation. ▶

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. . . that's what all of SPIKE'S abilities add up to. SPIKE is a proven total vegetation control product that is truly tough on weeds! What's your tough vegetation control problem? Whatever it is, consider SPIKE an essential weapon in your chemical arsenal. Contact your ELANCO distributor for full details on SPIKE . . . the tough one for total vegetation control!

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Contra Costa

enced a great demand for interior landscaping service although it has completed a number of inside jobs. Gerlack is especially proud of an indoor landscape he did for the Marin County Courthouse. The company does not aggressively seek indoor maintenance contracts at the present time.

One growing area for Contra Costa is maintenance of public athletic fields. Getting the fields in shape for the football season and repairing them afterward are two tasks more school officials are giving to professionals. Often, much of a school's athletic budget is derived from gate receipts of games played in its stadium. Consequently, the production of athletic contests is as much a business as it is a public service. Gerlack is currently working with a number of school systems for their stadium maintenance.

Contra Costa has a greenhouse for some of its plant stock. No retail selling of nursery stock or wholesale selling to other landscapers takes place.

Shunning large inventories, Gerlack purchases most chemicals by the job. Except for fertilizer, he makes monthly purchases of herbicides, fungicides, pesticides, and conditioners. These purchases total roughly $15,000 per year.

Equipment expenditure per year averages $25,000. He buys all vehicles rather than lease them. An inventory of Gerlack's equipment shows the following:

passenger autos — 8
pickup trucks (¾ ton or smaller) — 8
dump trucks — 2
tractors — 2 Massey-Ferguson 40 hp, 1 MF 65
hydroseeder — 1 Finn
riding mowers — 6
push mowers — 6
rototillers — 3 walk behind
1 tractor drawn
dethatchers — 2 walk behind
1 tractor drawn
forklift — 1 tractor attached
aerators — 3 walk behind
1 tractor drawn

Gerlack estimated his repair and maintenance costs at $5,000 per year. He keeps an inventory of problem parts such as belts, pulleys, etc. He does not keep a large inventory of backup equipment and stresses the importance of proper equipment care to his men. If a mower does break down Gerlack has to drive 70 miles to get service.

Residential landscaping entails combining manmade structures with nature's to provide a relaxing atmosphere.

Contra Costa

When asked about prices for certain types of work, Gerlack said nearly all his prices are bid according to specifications and costs. Rates for sod installation, he said, can be as little as 20 cents/sq. ft. for large areas with little soil preparation or as much as 40 cents/sq. ft. for small jobs with considerable soil preparation.

Contra Costa does little advertising. It carries an ad in the state's landscaping magazine for its hydroseeding service. Beyond this, it has brochures for selling maintenance service. Most of the job seeking is done by staying on top of the local building scene to be included in all available bidding.

If Gerlack has one single concern, it is the abundance of untrained and uncertified landscape contractors in the area. He anticipates the number of such people to jump when the market takes off this spring. He is a certified landscape contractor and thinks anyone spending money on landscaping should check the credentials of any individual claiming to be a contractor before giving the go ahead. Gerlack dreads competing with the "have pickup truck, will do anything" firms. They are the only negative aspect of what he anticipates to be a banner year for the landscape contracting business in the Bay Area this year.

Only three landscapers offer hydroseeding in the San Francisco area. Contra Costa is one.

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DISANTO COMPANIES: DESIGN, BUILD AND MAINTAIN

When DiSanto Companies moved into new and larger quarters in Cleveland two years ago, it renewed and increased its commitment to the landscape industry.

The DiSanto brothers, Dennis and George, decided it was time to expand their outdoor construction and maintenance business into the areas of design, lawn care, and interior landscaping. As a result, DiSanto is now in the top three in the Northeast Ohio market following a 30 percent increase in business in 1977 to more than $750,000.

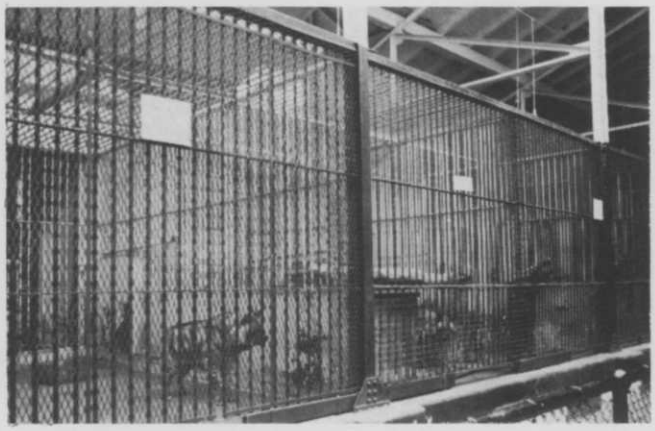
Short range goals are to purchase a large, local tree care company, increase its share of the lawn care market, and to continue to actively bid on both interior and exterior construction and maintenance projects.

Since last year, DiSanto has had a full-time landscape designer, Martin Pawlikowski, a graduate of the Ohio State landscape architecture program. Dennis DiSanto predicts that more landscape construction work will be under separate contract from the general building contract as landscapers develop their own design capabilities. The landscape work is often the last completed on a project and, if done improperly, can hold up acceptance and consequently payment to the general contractor. "If it's a sizeable project and the owners or the clients want to make sure the job is done properly, they will pull the landscape contract out of the general contract," Dennis says.

Landscaping has been a part of the DiSanto family for many years. Fred DiSanto, father of Dennis and George, was an estate gardener and exposed his sons to it. In 1959, the company was formed primarily for maintenance. The company's promise has been, "only what your turf and trees need and only when they need it. Some adjustment to this philosophy has been required for the lawn care division.

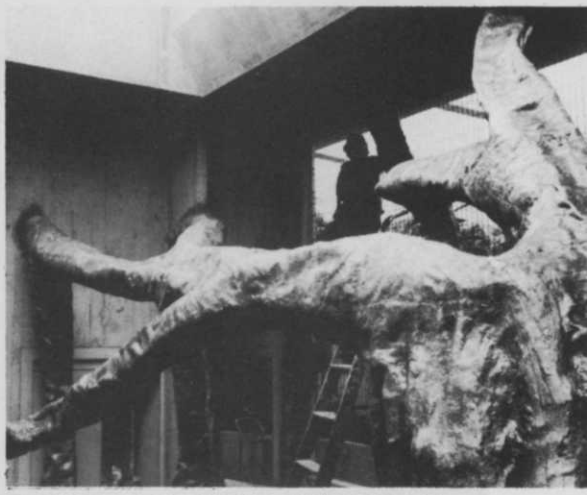
The company has its own greenhouse, but stays out of the retail

Putting the final touches on the zoo job are (l. to r.) George DiSanto, Dennis DiSanto, Carolyn Brown, and Martin Pawlikowski. The rewards of their efforts in exterior and interior design projects. (right)

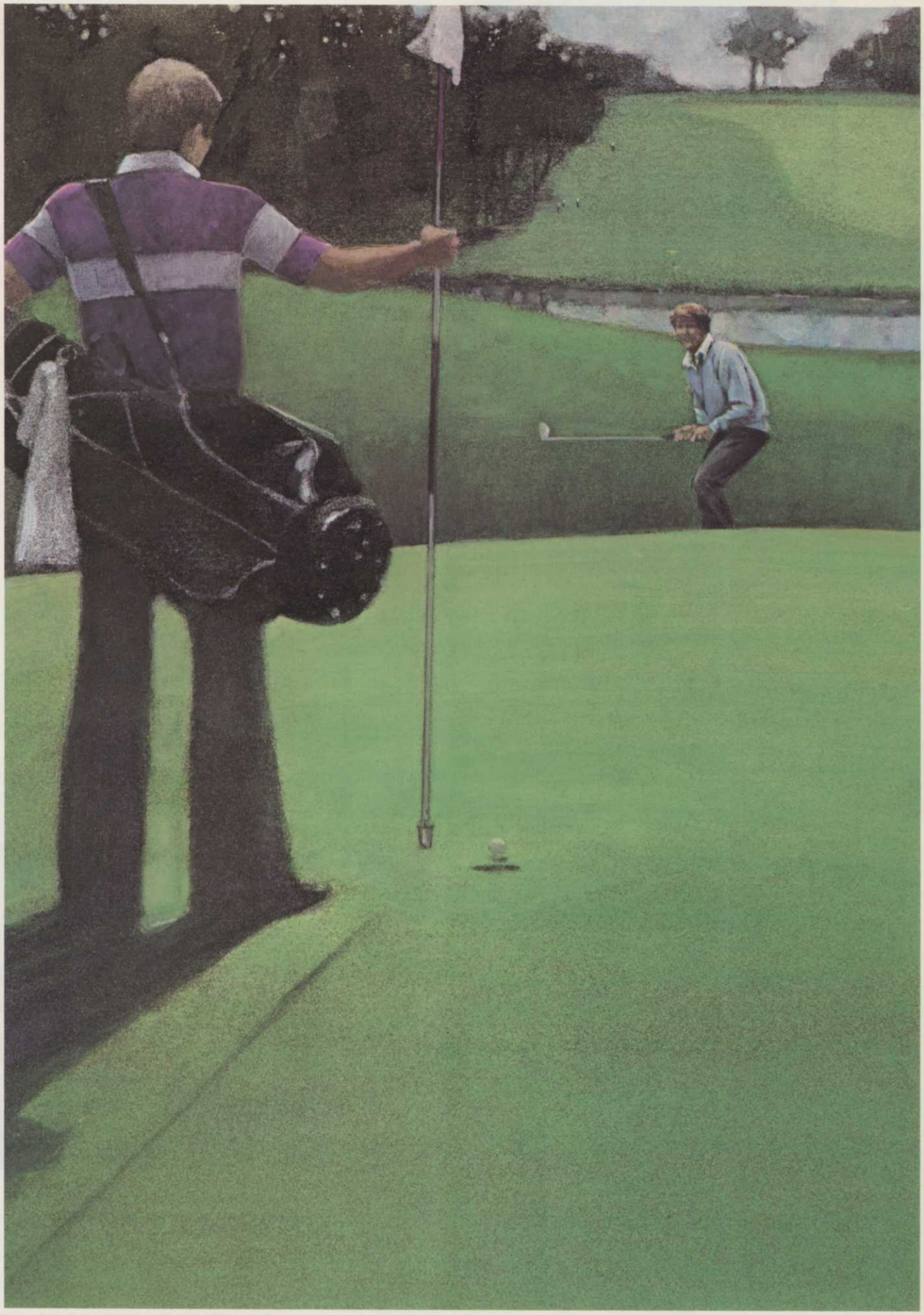


Just like the real thing

Before and after photos of the Cleveland Zoo. The old facilities were ugly bars and bare cages. The new quarters have creature comforts like trees to swing on, rocks to climb, and jungle foliage in the background.



The trees are constructed of fiberglas and cement over a steel frame (top). Behind the cages protected by heavy screen are the tropical plants (left).



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DiSanto

nursery business. "Retailing is a whole different ballgame from contracting," says Dennis. "It's tough to control both successfully. You have to separate the books because one side might be eating up the profits of the other." He mentioned a case of a business in both retailing and contracting where the retail end was draining the profits of the contracting end. Cost accountants told the owner to phase out or sell the garden center and concentrate efforts on the contracting business. DiSanto sells a small amount of its plant stock to other landscapers in the area.

The advantage DiSanto has over many landscape contractors is the ability to do all types of landscape work from design to maintenance. Currently, 90 percent of the projects designed and constructed by DiSanto are maintained by its crews during and after the guarantee period. It also can, and will, do any size job from maintaining a residential lawn to designing, constructing, and maintaining the huge, two-level, indoor shopping center Randall Park Mall.

The comprehensive design/build/maintain approach is paying off for DiSanto. It is invited to bid on nearly every major landscape project in Northeast Ohio. And when quality is considered equally with price, DiSanto often gets the job. One side effect of emphasis on quality in design is the loss of public jobs due to the one-sided price consideration of public bids.

Types of work subcontracted out by the company are large irrigation work, stone work, and hydroseeding. The company does most of its own patio and deck construction. DiSanto does the rest with an in-season staff of 35 and an off-season staff of eight. In 1977, construction and maintenance each accounted for half the company's business. Very rarely does the company do only design.

Expenditures for equipment in 1977 totalled nearly $45,000. All cars and small trucks are on three-year leases. Usually, DiSanto buys the vehicles at the end of the lease. Maintenance and repair costs were slightly more than $40,000 in 1977. DiSanto estimates that for every three pieces of equipment he has one piece in backup.

The company has the following equipment:
aerator — 1
forklift — 1
tractor mowers — 12
push mowers — 30
rototillers — 2
tank trucks — 1
pickup trucks — 4
dump trucks — 2
vans — 3
tractors — 2
spray rigs — 3
cars — 5

Dennis has strong words to say about some of the equipment. "One of our biggest problems is equipment maintenance and repair. Not so much the trucks or tractors, mainly cutting equipment. I just don't think the manufacturers have really addressed themselves to the landscape contractor who is using equipment six days a week. They are building equipment for the golf course and residential markets, not for the guys who are cutting millions of square footage.

"When you spend $3,000 for a mower and it's in the shop once a month at $150 each time, you get frustrated."

When you spend $3,000 for a piece of equipment and you have it in the shop more than once a month at $150 each time, you get frustrated. The main problems are belts, pulleys, reels, chains, and adjustments. The local repair shops can't meet our needs nor can they provide overnight service. That is why we have backup equipment."

Disanto showed us an old Jacobsen estate mower. "They stopped making this mower two years ago. We thought it was a great mower and can't understand why they stopped making it."

"The manufacturers don't seem to realize that we load and unload mowers from trailers six or more times each day. You can't afford to leave equipment at a job site, it has to be transported." Disanto tries to impress upon his employees to take care of the equipment.

The company spent approximately $30,000 for chemicals in 1977. "We do not carry tremendous inventories of chemicals because the products change rapidly within the market," DiSanto says. "We stock up for our spring application, reorder in June for our summer application, and order again in July and August for our fall application. We don't believe in tying up the money or space for a whole year's supply of chemicals."

Disanto's three divisions each have a different approach to advertising. The landscape division depends entirely upon word-of-mouth advertising. The lawn care division uses direct mail and Yellow Page display advertising. The interior landscaping division uses the Yellow Pages, local magazines, and something extra, a newsletter. The newsletter has proven very effective in educating the customer about the need for regular maintenance.

The interior landscape division, Interior Green, was created in 1975 when DiSanto was awarded the contract for a new mall in Akron, and in response to a growing demand by its customers for tropical plants. In 1977, the division's revenue exceeded $200,000. DiSanto hired Carolyn Brown, who had experience with tropical plant care at the retail level, to help design and direct the division. Interior Green's latest achievement is providing both spectators and animals in the Cleveland Zoo's new primate center with a tropical environment. A unique design makes the animals appear in a jungle-like setting without the animals actually being near the plants. DiSanto worked with a firm to build cement and fiberglass trees for the monkeys and gorillas inside their cages.

Interior Green has not limited its services to large, commercial clients. It also serves residential, small commercial, and industrial offices with installation and maintenance of tropical plants. Maintenance service includes watering, fertilizing, pruning, pest control, and addition of seasonal flowering plants to add color. Malls, banks, department stores, and office buildings are Interior Green customers.

Interior landscaping presents new challenges to a landscape company, DiSanto says. "All your plant

material comes either from Florida or California. Transportation to Ohio is risky because of the delicate nature of the plants. To fill an order for one major project may require three or four different suppliers and three to four months to get the material.

"The important thing with tropical material is the lead time necessary to acclimate the plants to their new growing conditions. Without this adjustment period, during which the plants are shaded, and gradually adjusted to lower temperatures, and humidity, the plants' chance for survival is only 60 percent. DiSanto claims that contracts are now beginning to require acclimatized material. "There are many things unknown about tropical plants and interior landscaping. It's a learning experience trying to keep these plants alive and healthy in a foreign environment."

Interior landscaping is also spreading into residential jobs. A few large homes are now being built or remodeled to accommodate tropical plants as a central feature.

The lawn care division, American Green Corp., incorporated in 1976, started primarily by making the lawn applications for existing maintenance accounts. Designed for the homeowner who does not wish a complete maintenance program, American Green applies herbicides, fungicides, and insecticides as a liquid spray and fertilizers in granular form. The firm also offers liming and a choice of liquid fertilization. Crabgrass preemergents can be mixed with the dry fertilizer and applied together.

The lawn care division uses vans which contain an 800-gallon tank for spraying and enough room for two tons of dry material. This system permits American Green to apply the various chemicals selectively, rather than using the same mixture for all accounts in one day.

As mentioned earlier, the company promises its customers, "only what your turf and trees need, and only when they need it." DiSanto and American Green manager Al DiSante (not DiSanto), have adjusted this policy slightly to align it with the lawn care customer's attitude. "The average lawn care customer is interested primarily in price and visible results with no headaches. They do not appear to care what you put on their lawn." To confuse the customer with a large number of decisions and prices can make selling difficult. The company is still very willing to discuss alternatives with an interested customer.

Three supervisors are certified chemical applicators. Although the company has eight year-round employees, DiSanto has made it a major goal for the next two years to find a way to employ all valued employees year-round. He is working on other ideas, like interiorscaping, to keep his employees busy in the winter.

One thing that has helped DiSanto and other landscapers in Ohio is periodic meetings held by the state extension service during which contractors candidly discuss major problems. At one recent meeting a landscape contractor from Michigan discussed his business.

The company belongs to the Associated Landscape Contractors of America, Inc.; the Ohio Turfgrass Foundation; the American Horticultural Society; and the Ohio Nurserymens; Association.

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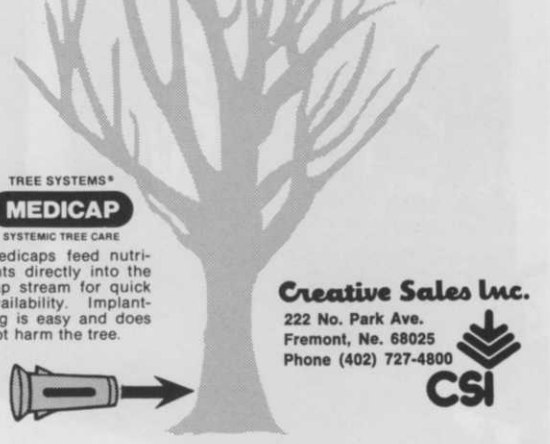

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LADYBUG INDUSTRIES: MAINTENANCE SPECIALISTS

Frank Timmon's Ladybug Industries landed its first commercial landscape maintenance job five years ago. The company now has three locations in Florida (Jacksonville, Fernandina Beach, and Boca Raton) and is grossing in the area of $545,000 a year. The company performs only maintenance work, and some plant replacement and installation of annuals.

"We basically don't advertise. We have a quarter-page in the Yellow Pages, but for the last three years we've done no soliciting at all," says Timmons. "We've got a very good reputation in the cities and we're known for quality."

How does a company which doesn't advertise account for a 28 percent increase in business over the year before? "The bulk of our business is coming from good clients who have opened another facility or bought another piece of property, or are operating in another city and want us to look at that. I think word of mouth and reputation has contributed to our growth as much as anything," says Timmons.

The company has 37 full-time employees. "We shoot for $9.00 to $9.50 per man hour," Timmons says. "We bid a lot of our work on condominiums and apartments on a unit cost basis. This will run anywhere from $5.50 to $8.00 a unit per month, depending on the density of the project, how much mowing there is to do, and how much shrubbery and bed work there is. You can put a good-sized mower in there and mow like crazy. Get in and get out. Others are quite sophisticated in their landscaping and they are time consuming."

Ladybug Industries handles only about 15-20 customers per year. "We

Royal Palm Plaza in Boca Raton is maintained by Ladybug.

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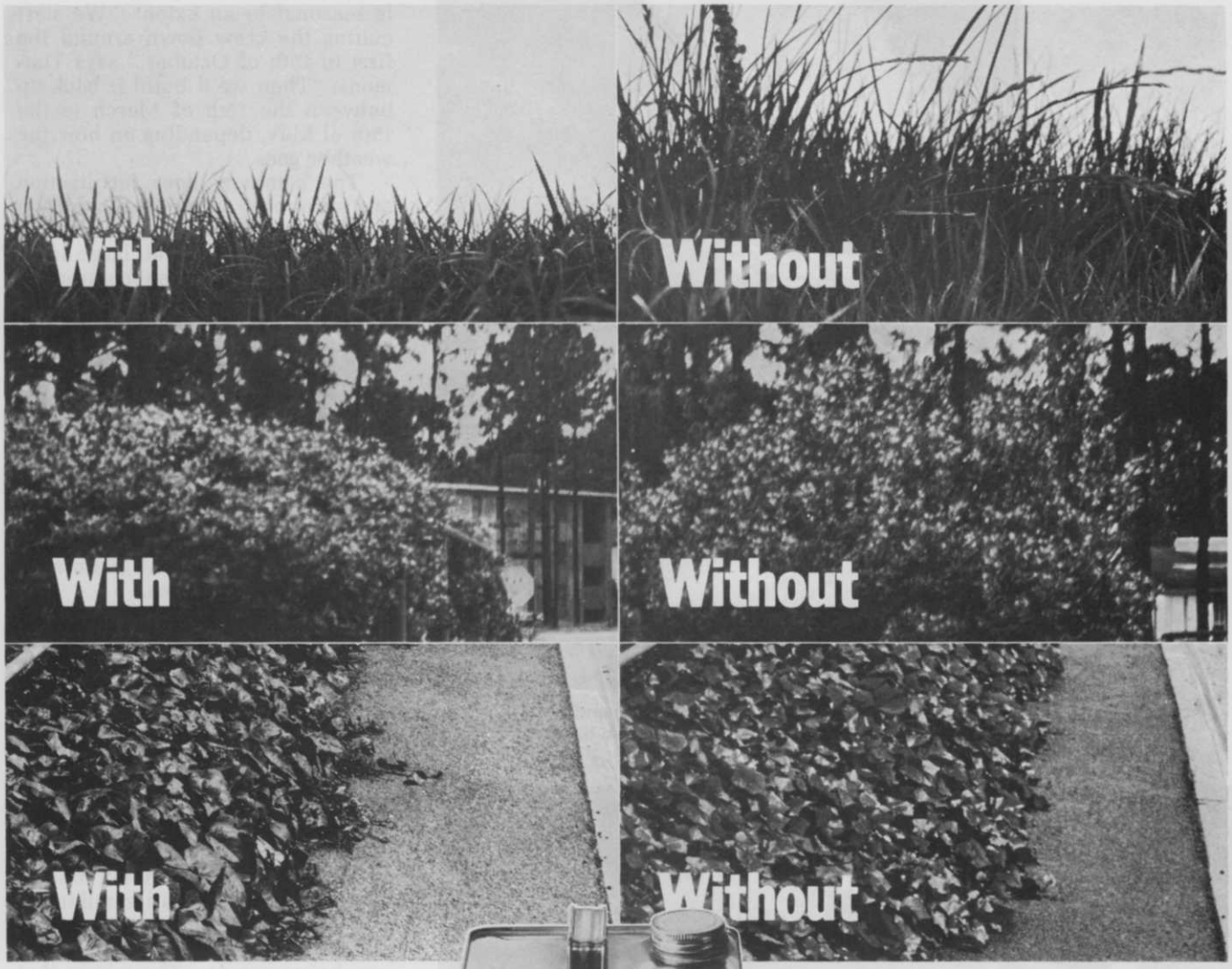

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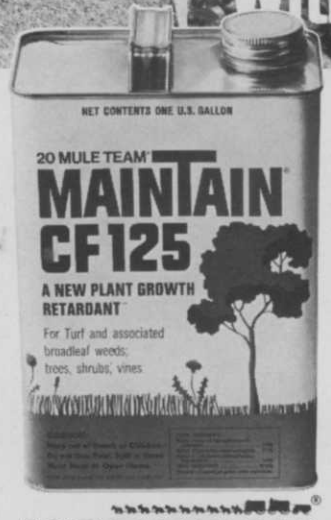
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New Jersey: 60 Craig Road, Montvale 07645
Canada: 234 Eglinton Ave., E., Toronto, Ont. M4P 1k5

Circle 159 on free information card

Ladybug Industries

Ladybug keeps the busy shopping center trim and colorful. It has numerous courtyards and tree-lined walkways.

don't have a tremendous number of customers," says Timmons, "we've just got good-sized customers."

Business for Ladybug Industries is seasonal to an extent. "We start cutting the crew down around the first to 15th of October," says Timmons. "Then we'll build it back up between the 15th of March to the 15th of May, depending on how the weather goes."

The company does fertilization and shrubbery spraying, in addition to other maintenance work such as mowing. At this time, all large areas of lawn spraying are subcontracted, though there are plans to add this service in the future.

Shrubbery spraying involves several different chemicals, says Timmons, but they are readily available and we don't maintain large inventories. "We do have enough on hand to do anything we want to when we need to do it. Right now, we spend annually $5,000 to $7,000 on chemicals and about $30,000 to $32,000 on fertilizers. We find that granular is better for our purposes."

Getting and maintaining good equipment seems to be a general headache for large-scale landscape contractors. Timmons echoes that sentiment. "The equipment that is available for landscape maintenance is either for the homeowner, or it's geared toward golf course operation. "We're much harder on equipment because we're mobile. We're loading and unloading either once, twice, even five or six times a day from a truck or trailer and it just gets used much harder. For example, we'll run an edger five to seven man-hours per day. The edgers that are available today are also those available to homeowners, where they might edge for an hour or two every two weeks. They just do not hold up.

Ladybug Industries probably spends $40,000 to $50,000 a year for new equipment. Approximately $24,000 to $25,000 is spent annually for equipment parts and repair.

As far as equipment inventory, Ladybug Industries maintains one car, a four-wheel drive vehicle, six vans, and two pickups. It owns two Kubota diesel tractors (17½ and 22 hp), two 16 hp tractors, and a number of Toro Groundmasters for mowing. All equipment is owned. Other equipment includes about 35 push

Continues on page 62

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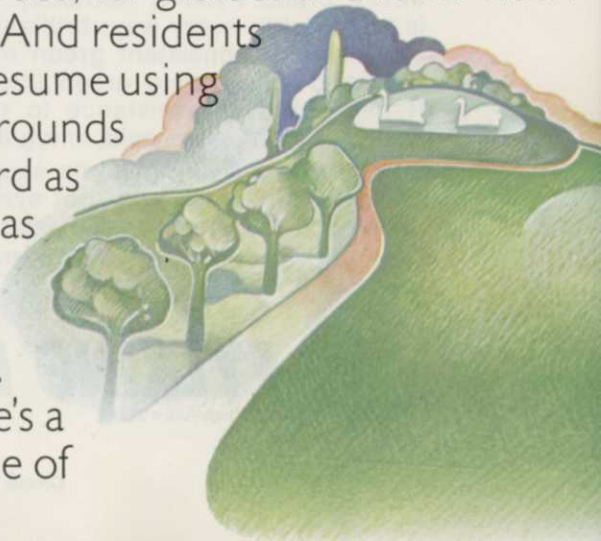

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Circle 112 on free information card

Ladybug Industries

The plaza contains almost 200 different shops and offices.

mowers, two Ryan thatchers, and three sprayers (25, 55, and 100 gallon). These sprayers are geared for hand nozzle spraying, all that is needed for the shrubbery spraying Ladybug does.

Four employees are certified pesticide applicators; all are in a supervisory capacity.

Finding qualified people is getting to be less of a problem according to Timmons. "When I first started there wasn't much interest in maintenance per say, but in the last three years it has begun to change."

"We're getting more and more inquiries from people who are graduating or will be graduating. We do still find, however, that the college graduate is not as interested in maintenance as he is in growing and landscaping, architecture, or design/build, that sort of thing.

"We will expand in the future. The type of things we will go into will be irrigation, the spraying end of the business, and of course, heavier into maintenance. We could possibly develop remedial crews where we go in and refurbish a landscape. I don't think though, at this-point-in-time, that we will get into design/build, reclamation, or that sort of thing."

Timmons feels that government regulations pose a problem. "We're concerned with EPA actions, especially the nematode problem. EPA has taken all the effective chemicals off the market. If we can't cure a problem like nematodes, the grass is slowly but surely going to be eaten up and we won't have any work to do.

"Our industry has made some good strides in the last couple of years. However, I do feel that, as far as a professionalism is concerned, we've still have a long way to go. We're probably the only service business that still is not looked upon as a professional service."

"I think the future of our business is quite bright. I see more large companies getting much larger. I see a lot of opportunity for us. Primarily because bigger and bigger jobs are becoming available. The small guy just is not going to be financially able to handle those kinds of opportunities.

"We do need to work continually to get to the point where we're considered professionals.

NAUD BURNETT: CONSTRUCTION AND DESIGN

By Naud Burnett, Dallas, Texas

Presented during the American Association of Nurserymen's 102nd Annual Convention, July 16-20, 1977, in Seattle, Washington. The presentation was arranged for by the National Landscape Association.

The landscape plan and installation become a personal art form for the client.

From its inception, the goals and policies of my companies were based on my personal experiences and observations while working for another firm, gaining invaluable experience over a seven-year period. I had the fortunate experience of being assistant to the president of a large landscape company, and sat in on all private business discussions and client contacts throughout the day. He was a master salesman, with impeccable taste, and I was an interested and observant student of his techniques and decisions.

When the situation occurred for me to leave and start out on my own it was necessary for a deep soul searching of what, where, and how, since my capital was limited. My success has been based on those past experiences, and the desire not to make the mistakes which I had observed of my previous employer. Needless to say, I have, unfortunately, repeated many of those mistakes, but have always recharted my course to correct them.

Basically, the business is built on a complete personal service of a landscape architect from beginning to end. Personal taste, style, and experience of the landscape architect are extremely important, so that the landscape becomes an integral part of the entire, unified design. The design is based on the client's wishes and utilitarian needs, while being compatible with the architectural design, and reinforcing the architectural concept.

The landscape plan and installation become a personal art form for that specific client, and that particular design would not necessarily fit the needs of another client in the same house or building.

For an insight into our business, the following will explain how and why we do what we do.

I am a graduate landscape architect, and was teaching in college at the age of 19. Teaching did not give me the personal satisfaction I was seeking, so I chose to work in private practice for seven years. This is my twentieth year in business for myself. My goals have changed, and I have sold my business to my key personnel. I am now working for them for a minimum of five years.

Many people cannot understand my selling out and supposedly semi-retiring, but I am satisfied with a well-thought-out plan of financial security, more time with my family, and other business interests. It's now time for another generation to work 12 hours a day.

My interest also lies in the estab-

Naud Burnett

lishment of a new Hydro-Culture industry for growing plants indoors and out-of-doors without soil. It is a revolutionary concept, and is very exciting and stimulating.

We are proud of our 20 awards over the years, but especially the personnel who are responsible for the hard daily work which bring these successful jobs to a completion. Without them, it would not be possible.

Actually, the overall business is divided into two organizations. One handles design and supervision on a professional basis, with a staff of six landscape architects. The other is a landscape company which only installs plantings, with a staff of 30 to 50 employees.

Qualifications for landscape architects are much different than for landscape company personnel. They must show a flair for design, good taste, and quick understanding of problems and solutions. They should be the type of person who would make a good future partner. They can be found only by many interviews with prospective employees, and proving to the specific person that you have something to offer them as well. Always make sure they understand "no moonlighting".

Landscape personnel qualifications vary with positions, but always honesty, knowledge, and integrity are uppermost in mind. A company-oriented person is always sought.

Our landscape architectural firm keeps a current prospect list (computerized), with a constant update. A regular newsletter is mailed out to this list. It has been highly successful and creates conversation.

Seasonally (twice a year), the landscape company goes back to old clients and plants spring flowers or

Qualifications for landscape architects are much different than for landscape company personnel.

Actually, little business is sought on a landscape level, as 70% is self-generated from a complete package service, and 30% comprises miscellaneous work not involving plans. Two expert sales personnel handle these miscellaneous jobs and bids, as well as the contract work from plans. Only seldom would we bid or install a job planned by another landscape architect. We do no maintenance work.

bulbs in the fall. This falls into the miscellaneous jobs that are not sought after. It is beneficial in keeping the older gardens blooming and up-to-date, and it allows for corrections in maintenance performed by others.

Approximately 70% of the cost of the average landscape plan is involved in the installation of construction other than plantings. The design firm gets bids from reputable

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qualified contractors, and the figures are outlined on a format so the client can make the selection of the contractor.

Contracts are signed with each individual contractor, and we charge an inspection and coordination fee of 12% of everything except swimming pools, which are 6%. No fee is charged if our company installs the planting, but is charged if done by others.

Fees for work involved are billed monthly, based on amount of bill approved for contractors. Contractors' bills are sent to us for approval, and forwarded to the client to be paid direct to the contractor. Any changes in plans or quotations are confirmed by letter and owner's approval, to eliminate any misunderstanding when the job ends up with a different cost.

Any changes in plans are confirmed by letter to eliminate any misunderstanding.

The landscape contracts are clearly outlined as to the services, warranty, and materials to be used with a flat quotation for the job. A 30% request for prepayment is made, and subsequent periodic requests for payment are made as work progresses.

Visual aids used are photographic albums, slides shown at the office conference room, and personal tours of existing gardens.

All estimates from both firms are broken down into detail. We have no sales pitch, but rely on our integrity, experience, and reputation. Low key sales: here it is — this is what it costs — you're buying it. We do explain that if they wish, the cost could go up or down with more expensive materials or smaller sizes. Clients seem to be pleased when you say here it is, study it, and we can get back together if you don't want to make the decision today. It is going to be more expensive next year.

All warranties on construction are by contractors. Landscaping warranty covers loss for one year, with a clause for exceptions due to "acts of God." Landscape architects are insured for professional liability for one million dollars.

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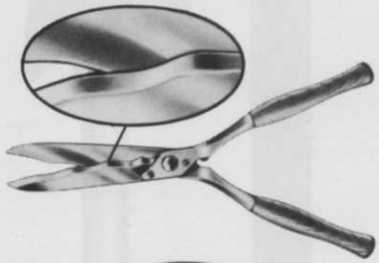

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LANDSCAPE CONTRACTOR

Naud Burnett

where cost is not as important as quality and responsibility. It personally gives me the satisfaction of seeing beautiful jobs executed; that is as important an ingredient to life as making money. If there is any image we attempt to project, it is that we strive for perfection that is never attained.

Our personnel are trained in weekly meetings, and taking new employees along on appointments.

Charges for landscape plans and specifications are based from experience on time involved in solving a particular problem. In most instances, the fee is a flat fee, but we also do work on percentage and time basis. The plans and specifications are very detailed, and vary in cost from $400 to $30,000.

We strive for perfection that is never attained.

We normally work within a ten state area on landscape plans, and stay within the Dallas metroplex on landscape contracting.

Our sales personnel are urged to wear coats and ties (sometimes difficult in Dallas summers). Planting crews wear uniforms.

We have no sales yard, as we do no retail business, but we have a storage lot where typical specimens may be observed in container or permanently planted in a landscape setting. Our plant holding area is one acre in the central city, and 20 acres on the outskirts of the city. Our offices are well located, and expensively furnished.

We advertise in D-Magazine, newsletters, and Junior League Magazine. All hit the upper market. Our logos are used on all publications and printed matter, and are distinctive. Letterheads, business forms, etc., have been in a constant state of evolution over the period of 20 years. Signs are used on trucks that are identical to easels used on each job. These are excellent advertising tools at no constant expense.

I hope this gives you an insight into the inner workings of one Dallas landscape firm. Undoubtedly, these procedures are repeated by each of you, with variations, as no one does anything the same way.

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Fast, precise landscaping. Ford 3-point hitch and hydraulics (optional) with twin lever controls. Response is smooth and accurate with fine increments of adjustment.

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75TH ANNIVERSARY

Sprinkler *from page 36*

COMPONENTS

Equipment for these systems consists of above-ground rotary sprinklers, quick-couplers, and quick-coupling valves. These components, together with a simple system of piping, comprise the cheapest watering system that can be installed.

ABOVE-GROUND SPRINKLERS. Most of these sprinklers are of the basic impact type with a swinging drive-arm. In one variation, the drive arm swings vertically instead of horizontally. Principle of operation is as described for impact drive, pop-up rotary sprinklers which are an adaptation of the above ground sprinkler.

QUICK-COUPLING VALVES. The valve is used to connect the above-ground rotary sprinkler to the water piping. These valves are installed flush with the turf, the same as sprinkler heads.

In the normal method of use, water pressure is maintained continuously at the Quick-Coupling Valve. Water pressure and a spring hold the valve closed when not in use.

METHOD OF OPERATION. The above-ground sprinkler is connected to a Coupler. The coupler is screwed into the valve, forcing the seat down and open. This allows water to flow through the coupler and sprinkler.

On smaller, more compact installations, it is customary to design the system so that sprinklers can be attached to successive quick-coupling valves for the sake of convenience. On larger projects, the system is usually planned for connecting sprinklers at alternate valves for each operation; or every third valve, or even alternate rows in some cases. Golf courses using the larger coverage diameter heads of 150 feet, 200 feet, or even more, commonly operate one sprinkler per fairway.

With operation as outlined in the preceding paragraph, the flow of water is quite well dispersed throughout the system. Spreading out the water load in this manner will permit reduction of pipe sizes, providing initial cost savings without affecting performance. However, some additional cost of moving sprinklers around will be incurred.

EFFICIENCY

Although quick-coupling systems have the lowest initial cost, there are other cost factors that must be considered. Generally, sprinklers with larger diameters of coverage are used with these systems. Greater overlap must be provided, and the longer streams are more subject to wind drift. Both of these factors result in wasted water.

A second major factor in the decline in use of quick coupling systems is the high cost of hand labor. Labor to operate these systems is a continuous expense. Elimination of this expense is a primary reason for increased popularity of automatic rotary systems.

DESIGN CONSIDERATIONS

Watering is accomplished by individually plugging the sprinkler-coupler combination into the quick-coupling valve. Sprinklers are left in place until the desired amount of precipitation is attained, then the sprinklers are removed and coupled to another set of valves, usually adjacent to the area just watered. Sprinklers are moved about in this manner until all areas have been watered. Sprinkler rotation is slow enough to enable the operator to plug-in and remove sprinklers without getting wet.

The above-ground sprinklers are available with diameters of coverage similar to those of pop-up rotary sprinklers. In addition, a number of models have a significantly greater range of throw. Spacings must be derated to compensate for wind.

An exception to the above is golf course systems designed with a single row of very large coverage diameter sprinklers in the center of each fairway. In order to provide adequate mean coverage, golf sprinklers are spaced to throw head-to-head. A common design method is to space quick-coupling valves 85 to 100 feet and use sprinklers with a coverage radius of 90 to 110 feet.

COST FACTORS

Total cost comparison of pop-up rotary vs. quick-coupling systems including (1) amortization of initial cost, (2) operation labor, (3) maintenance, and (4) water usage efficiency, consistently shows that the automatic pop-up rotary system is actually the least expensive over a period of years. **WTT**

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TWELVE EXPERTS TO ADVISE MAGAZINE FOR GREEN INDUSTRY

Weeds Trees & Turf proudly presents its first Industry Advisory Board. The twelve Green Industry leaders will advise the magazine staff as to editorial content, opinion, and direction.

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The expertise of the Board members is broad on purpose, the magazine covers a wide field of professions. Associations were contacted in the selection process for their recommendations. The final group gives the magazine a broad informational base and provides the reader with input rarely possible in trade publications.

These twelve dedicated individuals are glad to discuss the magazine at trade shows, regional conferences, or any industry gathering. We encourage you to discuss your ideas with them. They will pass your ideas on to us for action.

Certainly, any reader should still feel free to contact either Bruce Shank or Ron Morris (telephone 216-651-5500) any time with ideas for improving the magazine, news, or articles. Call person to person with a message and we'll call you back. The office address is 9800 Detroit Ave., Cleveland, Ohio 44102, if you prefer to put your ideas on paper. Don't forget the free comment card in this issue, either.

In order for you to get to know the magazine's Board, each member has written a "State of the Industry" message about their particular area. For the next few months these statements will be published. We welcome your response to their statements for the "Letters" section of the magazine, this column is a forum for industry discussion in an effort to help progress through communication.

Rodney L. Bailey

Rod Bailey is president and general manager of Evergreen Services Corp., a division of SBG Inc., in Bellevue, Washington. SBG Inc. is a business counselling firm co-directed by Bailey and Thomas C. Graham.

Rod received his A.B. in economics from Stanford University in 1959 and entered the MBA program there to study small business and production management. Bailey has been an industrial engineer for Proctor & Gamble and a small business consultant for Harry J. Prior & Associates in Seattle. His major responsibilities were cost control, inventory control, planning, business organization, economic analysis, and site location. In 1971, he formed SBG Inc. in the Puget Sound area.

Bailey is a member of the Associated Landscape Contractors of America, the Professional Grounds Management Society, Washington State Nurserymen's Association, and the Community Associations Institute. He is past president of the

Seattle chapter of the American Institute of Industrial Engineers.

Rod and his wife live in Woodinville, Washington, with their three children.

There are few industries today with the breadth and depth of exciting challenges which exist in landscape contracting. The scope of this industry has expanded greatly in recent years to include many specialty firms in maintenance, design/build, erosion control, irrigation, lawn care, spray application, tree care and others. The environmental "boom" of the '70's is consolidating into much more than simply an influx of new companies. There is an emerging industry with the capability of coordinating action and focusing on itself in understandable terms.

The history, status today, and challenge for the future are nowhere better stated than in ALCA's Crystal Ball Committee report, *Landscape Contracting Today and Tomorrow*. I urge everyone involved in the Green Industry to obtain a copy and read it.

Between 80 and 90 percent of the companies actively engaged in one phase or another of landscape contracting classify as small businesses. They have the common challenges of all small businesses today in America including development of professionalism in all phases of management, coordination of support for legislative representation, a growing need for people development and training and a need to keep up with increasingly rapid technical changes and advancements. Sharpening management and financial skills and obtaining capital for the growth needs of the next few years are particular areas of need throughout our industry.

With a growing multiplicity of trade associations and groups representing various phases of our industry, it is necessary to find the means for improved coordination and communication between them.

The state of landscape contracting ten years from now will depend entirely on how well these challenges are met.

William A. Meyer, Ph.D.

Bill Meyer is research director of Turf-Seed, Inc., and president of Pure-Seed Testing, Inc., both in Hubbard, Oregon. He was previously research director for Warren's Turf Nursery in Palos Park, Illinois.

Bill received his Ph.D. in plant pathology from the University of Illinois in 1972. He has worked in landscaping and as an assistant superintendent for two country clubs. His research interests are breeding and selection work on turf-type perennial ryegrasses, Kentucky bluegrasses, and fescues to improve disease resistance, turf performance, and seed yields. He is a member of the American Society of Agronomy, the Midwest Golf Course Superintendents Association, the American Phytopathological Society, and Alpha Zeta Honorary Fraternity.

Meyer lives in Silverton, Oregon, is married, and has three children.

The winter of 1977-78 in the Willamette Valley of Oregon has been good for the growth and development of seed production fields. Rainfall has been abundant which is normal for this area. The rainfall along with moderate temperatures and few frosts have promoted good growth of new seedings and old stands. One negative effect of the moderate temperatures could be the overwintering of rust fungi in old leaf tissues which will result in abundant inoculum in the spring.

State and Federal restrictions on the acres of grass seed fields to be open-burned will also result in increased quantities of rust inoculum in unburnt fields. In the 1978 production season, state regulations at the present will allow 180,000 acres to be burned which will leave at least 60,000 unburned acres. The lack of burning will result in greater disease pressures, insect problems, weed control challenges and reduced seed yields.

The popularity of the new turf-type perennial ryegrasses throughout the world has resulted in increased acreage of these varieties in the Willametter Valley in recent years. These varieties have been well accepted in bluegrass blends in the northern US and have performed very well for overseeding dormant bermudagrass greens in the southern US.

There has been an increase in the amount of variety development work being conducted by private companies in the Willamette Valley. Varieties of perennial ryegrass, Kentucky bluegrass and fine and tall fescues are being sought that have improved turf performance along with better seed producing abilities.

Stem rust in perennial ryegrass fields has been getting more severe in the last few years. Field burning restrictions are probably making this problem more severe. Plant breeders, such as myself, are striving to develop stem rust resistant varieties of perennial ryegrass in order to reduce production costs. This could be accomplished by eliminating the fungicide applications that are now required.

The seed producing abilities of all of the presently grown turfgrass species need to be improved to enable the grass seed farmers to meet the challenges of greatly increased production costs. This can and will be done through breeding programs which select attractive varieties that also combine the genetic ability of efficient seed production. Varieties are being sought which produce abundant seed heads with a high precentage of productive flowers.

Much cooperation is needed between the turf specialists throughout the world and the plant

Continues on page 74

Can Exhalt®800 cut your fungicide cost in half?

Many turfmen say yes. Our lab tests confirm it. Don't you at least owe it to yourself to spend three minutes reading the story?

For years, fungus disease control has been a source of trouble, frustration and expense. The problem is not the fungicide itself, but the application: how to keep it in place despite torrential rains and irrigation. The problem is wash-off.

That's why the development of Exhalt800 is a milestone of progress in the turf world. Here's the story:

Unlike many sticker-extenders that give little help, Exhalt800 encapsulates every fungicide particle with an armor of protection . . . a sticky, flexible "fabric" that clings to turf and foliage, essentially on contact. Yet it flexes and "breathes" to allow normal plant growth.

Because Exhalt800 keeps much of the fungicide in place, even in extreme weather, it can double or triple the control period. Even if it rains an hour after application, you'll still have effective control (see test chart), with less wash-off and less build-up of residue in soil.

Using Exhalt800, you may save 50% or more because you will need fewer sprays, you will use less fungicide with each, and reduce labor costs proportionately. Meanwhile, you can be confident the disease won't flare out of control. The evidence is clear.

In university field tests using leading fungicides, Exhalt800 added to spray tank at minimum-label recommendations gave control equal to higher recommendations without Exhalt800. With higher Exhalt800 dosages, you can double or triple the control period. Results can vary with the kind of fungicide used.

Exhalt800 costs little because it goes far (mix one pint with each 100 gallons in spray tank). Won't damage turf, trees and ornamentals when used as directed. Easy to use: add to spray tank and agitate. Easy clean-up: rinse equipment with water. If frozen in storage, Exhalt800 won't separate; may be thawed and used.

Too good to be true? The question doesn't surprise us. Compared with its competition, Exhalt800 *is* hard to believe. To know the truth, you should test it. On a golf green. A fairway. On any fungus-infested lawn or foliage.

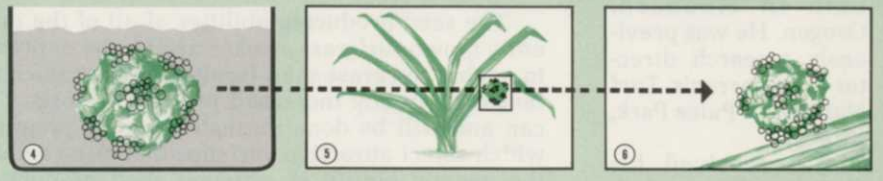
As an efficient manager, can you ignore the overwhelming evidence? See your Gordon distributor for information, prices and technical assistance.

A closer look at Exhalt®800 — the reason it works

1) Microscopic particles of fungicide are suspended in water in spray tank.

2) One minute fungicide particle, greatly magnified. Countless millions of such particles in water become the spray solution.

3) Exhalt800 liquid enters spray tank. Hydrophobic (repelled by water), it breaks into a myriad of tiny droplets and attaches to fungicide.



4) Tiny Exhalt800 droplets form a porous, flexible "fabric" that encapsulates each fungicide particle (enlarged to show detail).

5) Turf, when sprayed, becomes coated with millions of fungicide particles, each particle encapsulated within the porous "fabric" of Exhalt800 droplets.

6) Encapsulated fungicide particles on blade of grass (magnified portion). The Exhalt "fabric" around each particle is porous and flexible; it lets plant "breathe", flex and grow, releases fungicide slowly.

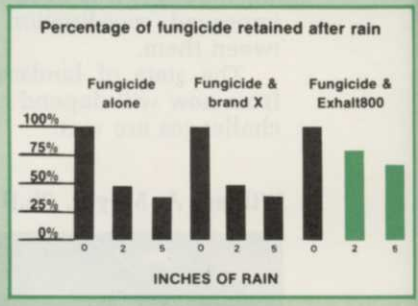


Chart shows how Exhalt800 resisted wash-off in a laboratory test. Spray coatings were applied to glass panels and dried 10 minutes at approximately 70° F. Retention after erosion by rain was measured by solvent stripping the panels and determining the residual fungicide by quantitative ultraviolet spectroscopy.

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BOARD *from page 71*

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Paul N. Voykin

Paul Voykin has been chief superintendent at Briarwood Country Club in Deerfield, Illinois, for 18 years and is the author of numerous books and magazine articles.

Paul, born in Canada, began his agronomic apprenticeship as a golf course superintendent in Jasper National Park in Alberta, Canada. Since moving to the United States he has worked as assistant superintendent at Olympia Fields Country Club, head superintendent at Calumet Country Club, and as chief superintendent at Briarwood. He is past president of the Midwest Golf Superintendent's Association and formerly was a commissioner for the Lake Bluff Park Board.

Voykin has authored two books; "A Perfect Lawn the Easy Way", published by Rand McNally, and "Ask the Lawn Expert", published by MacMillan & Co. Paul has had articles published in *Golf Business, Golf Digest, USGA, Home and Garden,* and *Flower and Garden*

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To all the young men coming into our profession I want to say this, "All your degrees and diplomas, all your microscopes, books, and thermometers won't be worth much to you, to our profession, and to the clubs you seek to work for, unless you first get some practical experience from a qualified superintendent in your area." **WTT**

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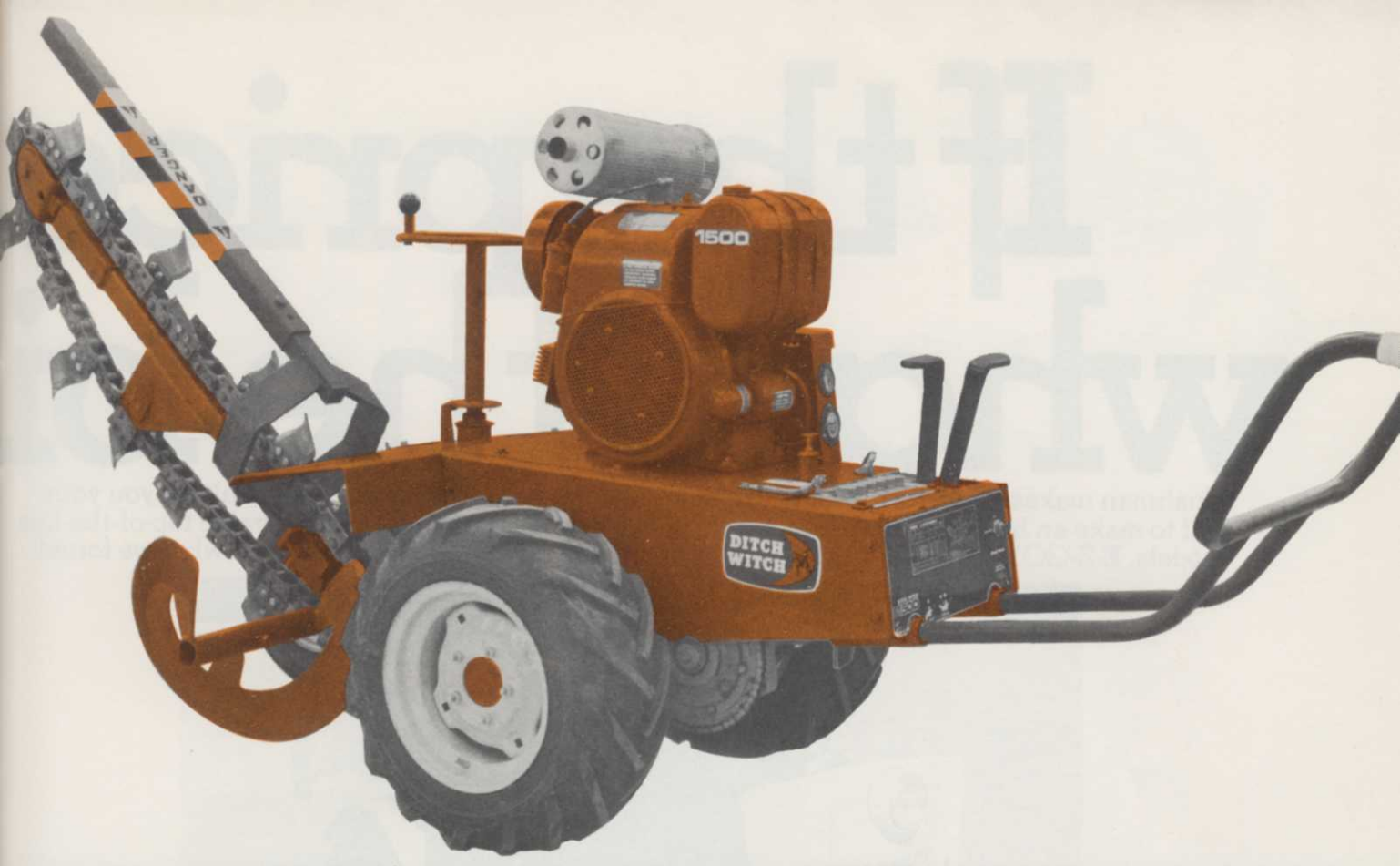

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Braking: Hydraulic internal expanding.
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Suspension System: Torsion bars, leaf springs, front and rear shocks.

Dump Construction: Single wall, no undercoating.

Headlights: Single.
Seating: Single seat for one passenger with back rest and hip restraint.

Price: Virtually the same.

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Suspension System: Heavy duty torsion bars, leaf springs, front and rear shock absorbers, designed to support the bigger payload.
Dump Construction: Dual wall, double thick for heavier loads, longer life. Undercoating for even greater resistance to corrosion.
Headlights: Dual lights for greater night vision.
Seating: Dual seats for two passengers with individual back rests and hip restraints, constructed for larger men, greater comfort.
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EFFICIENCY CAN INCREASE BY PRUNING YOUNG TREES

By Douglas J. Chapman, Horticulturist, Dow Gardens, Midland, Michigan

Pruning is one important area which offers a municipal forester and, to a lesser extent, grounds and golf course superintendents flexibility to manage trees and administer the department.

The key things to consider when setting up a pruning program include time, age and vigor of trees, and management of people resources. The old adage of "prune whenever the saw is sharp" is not optimal for wound closure or tree health. Current research by Shigo, Hart, et al clearly shows that there are two times each year to prune — March until bud break and August. Although pruning in March until bud break is far superior, another flush of growth (cambial activity) occurs in August which results in rapid compartmentalization and initial closure of wounds. Pruning during the fall or periods of decreased cambial activity results in slower closure, thus a greater opportunity for heartwood decay.

Age of the trees dramatically affects the time required to prune and for wound closure. The traditional five- to six-year pruning cycles are rarely completed on schedule. Normally, large, mature trees require more time to prune; hence, greater cost per tree. Not only is this economically difficult under today's municipal financial conditions, but the pruning wounds are larger and more numerous, increasing the chance of tree decline and/or decay. Many times the more mature plant isn't vigorous enough to compartmentalize the wound, thus heartwood decay and decline of the tree are the end product.

Crews can prune sixty trees per day, rather than five, using less equipment.

Many municipal foresters should conside a stated policy of "prune only newly transplanted trees at planting and again two and four years after establishment." This would mean that pruning crews would be able to *minimally* prune forty to sixty trees per day, rather than two to five, using far less equipment. This increase in efficiency would allow the municipal forester to give pruning the highest priority in the spring, while still being actively involved in a tree planting program. The trees could be pruned to a central leader, leaving good wide angle branching.

These trees, pruned correctly when young, two to three times and not pruned after the fourth year (on the street), except to remove dead or storm-damaged branches, would be trained to develop a sturdy structure which is better able to withstand severe storms. Further, since the branches and wounds on young trees will be small, most rapid wound closure would result. Spring pruning might also be an opportunity to surface apply fertilizer, further maintaining the vigor of these trees.

Many may consider pruning only young trees a pipe dream, but consider how beneficial it would be to have pruned the trees two to three times early during their growth. By doing so, developing a structurally-sound tree versus the five-year pruning cycle which, due to time and finances, is rarely completed and is always a catch-up emergency repair operation.

A city forester, in addition to being an arboriculturist, must also be a manager of human resources. One would expect that time and manpower saved by pruning only young trees could then be put to work on the many other high-priority programs which are difficult to accomplish — tree fertilization, new tree planting, insect and disease control.

This young tree pruning concept gives the municipal forester an opportunity to be a professional manager and arboriculturist, i.e. one who develops, trains, and improves the health of city trees under his care. **WTT**

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VEGETATION MANAGEMENT

By Roger Funk, Ph.D., Davey Horticultural Institute, Kent, Ohio

Q: *Has there been much progress lately in improvement of grass growth regulators (to save mowings)?*

A: A number of growth retardants have been researched for turf, and a few such as maleic hydrazide (Maintain 3, MH-30, Slo-Gro, Retard and chlorflurenol [Maintain CF-125]) are available commercially.

Unfortunately, growth retardants are expensive and the results unpredictable. The response from retardant applications is influenced by temperature; rainfall; time, rate and uniformity of application; and turfgrass species and vigor. Most of the chemicals cause yellowing of the grass blades and reduced tillering and rooting, which can have a long-term effect on turf health and density.

The use of growth retardants currently labeled for turfgrass should be limited to low-maintenance, hard-to-mow areas such as median strips and road banks.

Q: *At what temperature in the spring would 2,4-D, Dacthal W-75, Endothal, Paraquat have any effect on sprayed weeds?*

A: For broadleaf weed control, 2,4-D is effective above freezing, but maximum effectiveness requires actively-growing weeds which occur above 50° F.

Dacthal W-75 is a pre-emergent herbicide that controls germinating seedlings. The temperature at which seeds germinate is dependent upon the species, but if you are primarily concerned with crabgrass, the temperature is about 55° F.

You don't mention the intended use of Endothal, but if it is for aquatic weed control, the weeds should be actively growing, which occurs above 60° F.

Control with paraquat is not temperature-dependent but is affected by the amount of light.

Continues on page 82

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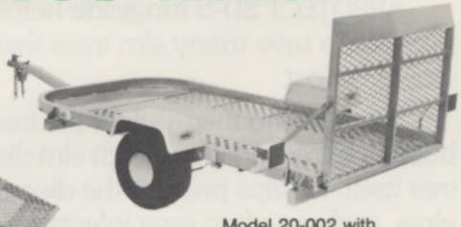

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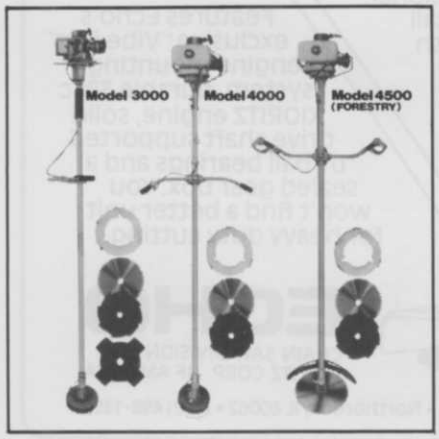

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weed and grass trimmer/brush cutter

Vegetation Management *from page 80*

Q: *Please advise best treatment for Japanese weeping cherry for borers.*

A: I do not have any phytotoxicity information specific for Japanese weeping cherry, but you might try lindane which is the standard recommendation for borers. Follow the instructions on the label and spray on a day with low humidity, preferably when the temperature is below 85° F.

Q: *It has been said that an evergreen's roots should never be allowed to freeze. To what extent or when is that true?*

A: Evergreens, particularly broadleafed evergreens, can lose a considerable amount of water through the foliage (transpiration) during the winter. Plants grown on locations exposed to the afternoon sun and/or drying winds are especially susceptible to water loss. If soil water in the root zone is frozen, the root system of the plant cannot absorb enough to replace the amount lost through transpiration. The resultant water deficit is evidenced by winter scorch on the leaves and, under extreme conditions, death of stem tissue or even the entire plant.

To prevent or minimize the potential for winter scorch, plant susceptible evergreens in areas protected from the winter sun and winds. Antidesiccants can be sprayed on the foliage in late November to suppress water loss, and the root area can be thoroughly irrigated to increase soil water.

Q: *How would you eliminate night crawlers (long earthworms) from a lawn? This lawn is about 10,000 square feet and has thousands of holes that are caused by these earthworms; they make the lawn too bumpy to mow.*

A: There are no compounds that I am aware of labeled for earthworm control. However, chemicals applied for white grub control have reportedly also controlled earthworms.

VEGETATION MANAGEMENT is a free problem solving service for any residential, industrial, municipal, or golf course landscaping topic. Write your questions for VEGETATION MANAGEMENT on the postpaid reader question card in this issue.

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ECHO

302ADX
Weed & Brush Cutter

Powerful professional cutting tool for tall grass, heavy brush or scrub trees.

Features Echo's exclusive "Vibe-less" engine mounting system, durable 30cc KIORITZ engine, solid drive shaft supported by ball bearings and a sealed gear box. You won't find a better unit for heavy duty cutting.

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PROSCAPE

By Michael Hurdzan, Ph.D., Kidwell and Hurdzan, Inc.,
golf course architects and consultants.

Q: *What is the best all-around fertilizer, and what is the best method of application for small trees about 2-3 inches in diameter.*

A: The question of the best fertilizer is at best rhetorical. For even as you scan the advertisements in this magazine you will see little agreement about the best fertilizer analysis for trees. However there is some consensus that the fertilizer ratio should be a 3-2-1 or a 3-1-1. These ratios are similar enough to those recommended for turfgrass that it may be simplest to fertilize your young trees with a turf fertilizer. The first word of caution is be certain that the fertilizer is not mixed with any herbicide especially Dicamba. Then if you accept that your turf fertilizer is adequate for your trees, the next question is what is the best method of application?

When fertilizer is applied to your turf area much of it may not reach the roots of the intended plant. Part of the applied fertilizer is lost to leaching and volatilization. Some may be chemically tied up in the soil. Some is used by soil organisms. Much of it is utilized by the turf or weed species growing there, and only a fraction of it may be available for the tree roots. Therefore, it is recommended that you simply apply more fertilizer inside the drip-line of the trees by making an extra pass with your fertilizer spreader at normal rate. Some horticulturists recommend applying the fertilizer in the spring on frozen ground so that the chemicals become dissolved in the melt water, enter the soil, and pass by the inactive turf roots to the tree root depth. As trees get larger, you may wish to investigate the more sophisticated means of tree fertilization.

Q: *When we receive a soil sample report, everything is given in "parts per million" (PPM). Is there a chart showing all the major elements and giving the best PPM for maximum grass growth?*

A: "Parts per million" (PPM) is a scientific measure that allows testing of small samples with

Continues on page 87

ECHO
200D
Weed & Brush Cutter

Easy-to-handle lightweight for home or farm. Features rugged, fast starting 21cc KIORITZ engine and ball-bearing mounted solid drive shaft with sealed gear box. Cuts with nylon line or steel blades.
ECHO
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KIORITZ CORP. OF AMERICA
3150 MacArthur Dr. • Northbrook, IL 60062 • (312) 498-1390
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ECHO
PB-9
Power Blower

Here's one sure way to speed up commercial clean-up. Echo's PB-9 Power Blower cleans up faster than a rake, broom or snow shovel. Moves out leaves, twigs, litter or snow with a 200 MPH jet blast. Packs on your back like a knapsack for high-speed, effortless cleaning. Features: fast-starting KIORITZ engine; solid throttle linkage with 10 precise speed settings; comfortable padded back rest.
ECHO
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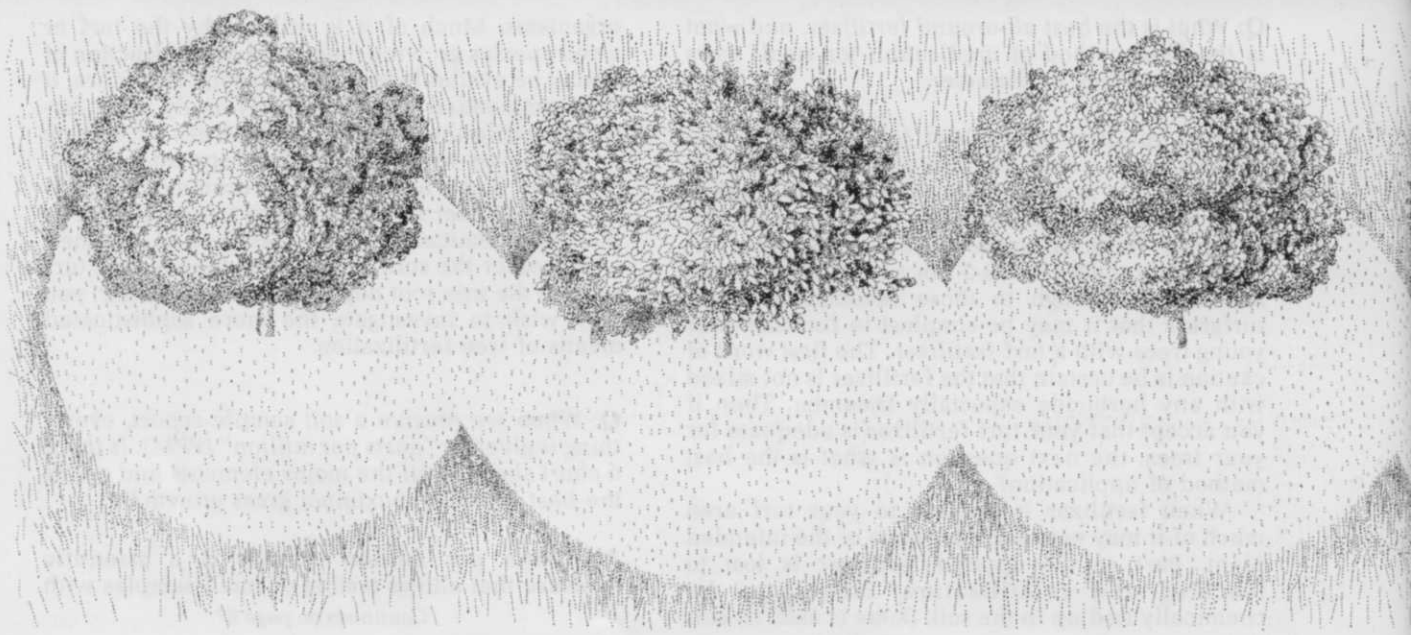
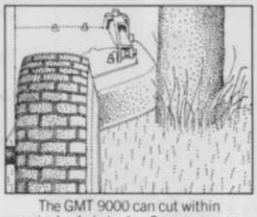
THE NEW GRAV
IT'LL RUN CIRCLES AROU



With its optional 72" mower and 50" wing, the new Gravely GMT 9000 cuts a 9', 11" swath, allowing an operator to mow as many as 33 acres in a standard eight-hour day.

But even better than that, the GMT 9000's tight turning radius and the 50" wing enable it to execute a 360° turn, leaving no uncut grass in the circle. As a result, an operator can mow down one side, turn right around and head back the other way without missing a blade of grass in between.



The GMT 9000 can cut within one inch of obstacles. So you save on trimming equipment.

Yet as big and sizeable as the GMT 9000 is, it's also maneuverable enough to cut within an inch of obstacles like fences, shrubs and trees. So you eliminate the need for a lot of costly extra trimming equipment.

Perhaps best of all, besides being able to mow a lot of grass, the new GMT 9000 is designed to keep doing it for a lot of years.

THE STORY OF OUR LIFE.

You see, beneath that impressive rugged exterior, lies an even more impressive interior. Designed to give each and every GMT 9000 a long, lively life.

The exclusive Gravely 8-speed transmission is a good example.

The result of years of testing, it delivers the precise speeds and power you need to do a lot of jobs a lot easier. And a lot better.

You get steady power at low ground speeds to handle the muscle jobs. You also get a choice of seven other speeds for mowing, hauling and rapid transit.

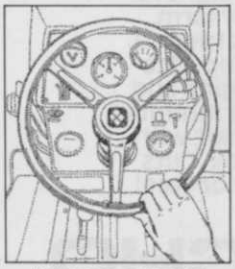
What's more, its precision-cut gears run in an oil bath, for less friction and longer life.

MORE POWER TO YOU.

The engine itself is another excellent example. A water-cooled 4-cycle, 4-cylinder brute, it delivers 26 HP at 3200 RPM. The engine has an oil filter and is pressure lubricated. The crankshaft is spheroid cast iron, counterweighted, running in three replaceable precision bearings.

The cylinder head is aluminum alloy for lighter weight and better heat dissipation.

The wet-type cylinder liners also help to dissipate heat.

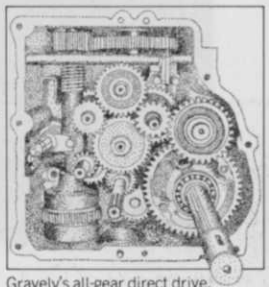


Full-time power steering makes a full day of mowing easy, and practically everything's right before your eyes on the full instrument panel.

The result is an engine that is built to last. And last. And last.

HANDLE WITH EASE.

Yet for all the GMT 9000's brute strength, it handles like a pussycat. The instant forward and reverse, by moving one lever, increases maneuverability, reduces operator fatigue. And you have full-time power steering.



Gravely's all-gear direct drive. A transmission with a lot of teeth in it.

Individual wheel brakes improve steering control. In proper locked position they provide a parking brake for the tractor.

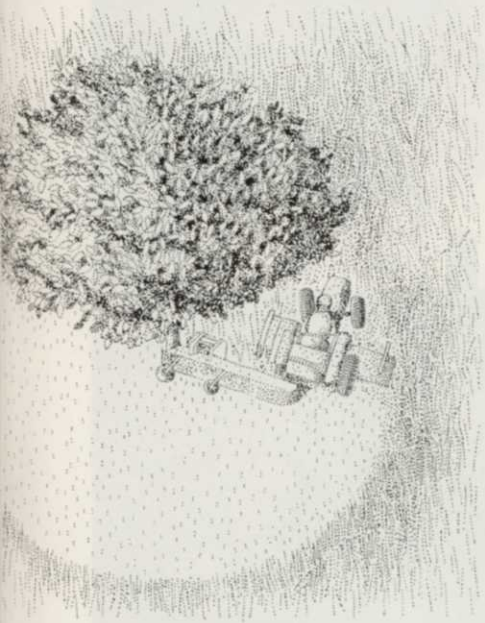
The high-back seat is foam-padded, hydraulically-suspended and fully adjustable for individualized operator comfort.

The full instrument panel shows the operator everything from the water temperature, to hours of operation, at a glance.

THINGS ARE TOUGH ALL OVER.

As you've already seen, every possible part of a Gravely is built extra tough to stand up to year after year of day-in, day-out grounds maintenance. The transmission housing is cast iron.

ELY GMT 9000.
ND THE COMPETITION.



The pivoting front axle is welded steel construction and comes with rugged king-pin bushings. Precision bearings are used at major wear points.

ALL-GEAR DIRECT DRIVE.

The Gravely all-gear direct drive from engine through the transmission and to the PTOs vastly improves power transmission.

And because it's all-gear, it completely eliminates the bothersome belts in the power train which have always been prone to break, slip or wear out.

WITH ALL YOU CAN ATTACH TO A GMT 9000, YOU'RE GOING TO BECOME VERY ATTACHED TO IT.

You've already seen how the 72" mower and 50" wing attachments make the GMT 9000 unsurpassed in mowing efficiency.

What's more, its optional live and independent rear PTO and category 1, 3-point hitch enable it to utilize a number of other attachments as well.

How to keep your tractor from going into hibernation for the winter.

Attachments like plows, cultivators, carts, sweeper and snowblower. As well as equipment like a seeder, sprayer, snow blade, aerator and enclosed cab.

As a result, the GMT 9000 can handle just about every grounds maintenance job imaginable.

In addition to building tractors to last, Gravely wants its attachments to last, too. That's why most Gravely attachments are engineered to be completely compatible.

IT CUTS COSTS NICELY, TOO.

Thanks to its greater performance, durability and versatility over most single purpose mowers, a GMT 9000 should result in a lower total cost ownership in the long run.

And, as you know, Gravelys do run a long, long time. Which brings us to yet another important point.

With as well as a Gravely performs, you won't want to replace it.

With as well as a Gravely is built, you probably won't have to.

If you've got a lot of grounds to maintain, let us show you a lot of grounds maintenance tractor.

Name _____ Title _____

Company _____

Address _____

City _____ State _____ Zip _____

GRAVELY®

Clarke-Gravely Corporation. A Studebaker-Worthington Company.

FOR THE GRAVELY DEALER NEAREST YOU, OR FOR MORE INFORMATION, CALL TOLL-FREE 1-800-528-6050 EXT. 280. OR FILL OUT THE ABOVE COUPON AND SEND IT TO: GRAVELY, 0424 GRAVELY LANE, CLEMMONS, NORTH CAROLINA 27012.

Circle 135 on free information card

Glade
KENTUCKY BLUEGRASS

grows great in sun

or in shade.

For football fields and/or shady glens Glade Kentucky bluegrass is the seed to specify for excellent performance. In full sun or cool shade (up to 60%) you can depend on Glade to germinate quickly, establish fast. Forms a thick rhizome and root system, dense, low-growing, fine-textured turf of medium to deep green in color.

Glade Kentucky bluegrass has proven resistance to many troublesome diseases including stripe smut and leaf rust. Better than average resistance to today's Fusarium blight has made Glade a vital fortifying ingredient in many professional turf grass mixtures. A higher level of resistance to powdery mildew in moderate shade.

A Rutgers University selection (tested as P-29), Glade Kentucky bluegrass is your guarantee of physically pure and genetically true seed.

Specify the sun-n-shade elite Glade Kentucky bluegrass seed for your next lawn seed mix, available at your local wholesale seed distributor.

Glade
KENTUCKY BLUEGRASS
U.S. Plant Patent 3151
Another fine, quality-controlled product of Jacklin Seed Company.

Circle 142 on free information card

Proscape *from page 83*

the possibility of extrapolating the results to a larger volume. To convert PPM to a usable and meaningful expression requires only a simple calculation to obtain a pounds per acre measurement. This calculation is based upon a term called acre furrow slice (AFS), which represents the oven dry weight of the top six inches of an acre plot. It is a constant at 2,000,000 pounds. So, if your test result shows that the sample tested had 20 PPM of phosphorus, you can calculate the pounds of phosphorus per acre by multiplying the PPM by 2. (20 ppm x 2 = 40 lbs./acre). Or, for you math majors:

$$\frac{\text{ppm}}{1{,}000{,}000} = \frac{\text{pounds per acre}}{\text{lbs./acre furrow slice}}$$

$$\frac{20}{1{,}000{,}000} = \frac{X}{2{,}000{,}000 \text{ lbs.}}$$

$$20 \times 2{,}000{,}000 \text{ lbs.} = 1{,}000{,}000X$$

$$\frac{20 \times 2{,}000{,}000 \text{ lbs.}}{1{,}000{,}000} = X$$

$X = 40$ lbs./acre

Either method gets the correct answer.

Most soil test laboratories give results in pounds per acre, but as you can see the conversion is simple (the first way). From there you just go by the recommended pounds per acre for elements for vegetation in your area.

Q: *Why aren't grasses tested on different soils under conditions found in different areas of the states; within 10 miles of Lake Erie the soil conditions change 3 times?*

A: Tersely, the answer is time, money, personnel, and a lack of a need. However, your question is a good one.

But you, as a manager of plant growth, need not be without specific information on growing a particular plant, species, or cultivar in any given area, condition, or region. This specific information is a product of Experience Sharing with other professionals in your locale. Probably the most usable information you will ever get will come from your fellow practitioners who have joined together to form and support a local chapter of some professional organization. Continue to do your own trial and error research as most others are doing and then support a forum to exchange such experiences.

R-100 gal.
Tuflex
FIBERGLASS SPRAY TANKS
Tuflex Manufacturing Co...specialists in pest control fiberglass spray tanks. Economical prices with high quality handcrafted workmanship. Many other tank sizes available from stock.
PC-1200 gal.
CONTROL PESTS... WEED... FERTILIZE
ECONOMICALLY
WITH FIBERGLASS SPRAY TANKS
D-200 gal.
U-600 gal.
THE Tuflex Manufacturing process allows a five year warranty on all tanks.
Plant Location: 800 Eller Drive, Port Everglades, Fort Lauderdale, Florida
PC-800 gal.
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THE LARGEST FIBERGLASS "PEST CONTROL" SPRAY TANK MANUFACTURER IN THE SOUTHEAST
Write today to: Tuflex Manufacturing Co.
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LASTS A LIFETIME
Tuflex MFG. CO.
FIBERGLASS PRODUCTS
C-500 gal.
C-200 gal.

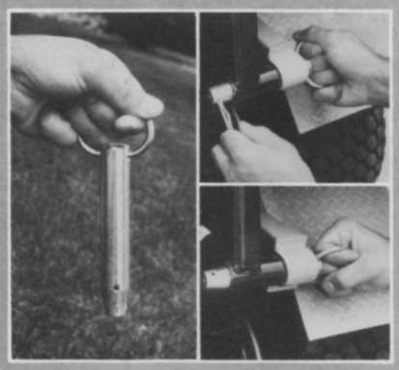
Circle 139 on free information card

Cushman Turf. Everything

Cushman Turf has developed an easy system to help you save as much as 35% in equipment investment. A system that saves you time with built-in job flexibility. A system that does everything but mow.

The Cushman Turf-Care System includes equipment for aerating, dumping, hauling, top dressing, spiking, fertilizing, spraying, seeding and spreading. The attachments utilize the unique pin-disconnect system.

In addition, all our turf care equipment is designed to be totally compatible with our 3- and 4-wheel pin-disconnect Turf-Trucksters.



PULL PINS. The pull pin advantage of the 18-hp Cushman Turf-Truckster means fast on/off movement of all attachments; it's the secret of the Cushman Turf-Care System's versatility.

1 QUICK AERATOR. The Cushman Quick Aerator is designed to slice greens quickly during the hot, dry periods.

Just attach the Quick Aerator to the Turf-Truckster with three pull pins. The hydraulic system and dump kit on the Turf-Truckster allow you to lift and lower the Quick Aerator on the go from your seat. So movement from green to green is simple and fast.

Three types of tines are available: slicing, coring (two sizes) and open spoon.

2 SHORT DUMP BOX & FLATBED/BOX. The short box or the flatbed/box is capable of hauling up to 1,000 lb. payloads.* A manual hydraulic dumping system is available, and either box is mounted quickly using only two pull pins. 18-hp pin-disconnect Turf-Trucksters can be equipped with powered hydraulic dumping. By adding the PTO and hydraulic packages you can dump hydraulically without leaving your seat with either 18-hp Turf-Truckster. Just push a lever.

*Rating for vehicle equipped with 9.50-8 rear tires.

3 QUICK SPIKER. Attach the Cushman Quick Spiker to a Turf-Truckster equipped with PTO, hydraulic system and dump kit with just three pull pins. Spike a 57-inch swath, even over undulating greens, with the two precise spiking gangs. Nothing to tow. Nothing to load or unload. Spike 18 greens in less than 2½ hours.

4 TRAILING SPIKER. Attach the Cushman Trailing-Type Wheeled Spiker and you'll get the same results as with the Quick Spiker, except the Trailing-Type Spiker is controlled by a pull rope to raise and lower while operating.

but mowing.

5 SPRAYER. The PTO package with extension shaft makes the 18-hp Turf-Truckster ready to spray greens the easy accurate way.

The Turf-Truckster transmission and built-in variable speed governor assure a uniform ground speed, even over varying terrain. And an accurate metered spray means proper application and less chemical waste.

The complete optional spray package includes: 100-gallon capacity tank, high-flow nylon strainer, jet agitator for mixing, high-pressure handgun (which sprays up to 40 feet), rear sprayer boom, centrifugal pumping system for boom or handgun spraying.

6 TOP DRESSER. The chassis-mounted top dresser, driven by the PTO of the Turf-Truckster, eliminates the need for self-powered units and time-consuming walking.

The moving bed and rotating brush operate at a controlled speed to dispense top-dressing materials and direct them downward in a 31½-inch swath. The engine/ground speed governor keeps your spreading rate constant.

7 SPREADER/SEEDER. The Cushman Cyclone Spreader/Seeder can be rear mounted on either the 3- or 4-wheel 18-hp Cushman Turf-Truckster, and it's controlled by the Cushman PTO extension shaft. Depending on the material, this spreader can broadcast over an area up to 40 feet wide.

In addition, the Cyclone Spreader/Seeder mounts on either the short box or flatbed/box and the driver controls all operation from his seat.

8 GREENSAVER (DRUM AERATOR). The Cushman Greensaver™ is the efficient low-cost way to aerate greens and tees. Attach the Greensaver to your Turf-Truckster (equipped with a hydraulic system and dump kit) with 3 quick-release pull pins.

Add weight trays and sand to the Greensaver attachment and you're ready to aerate up to 10 times faster than walk-type units. And the Greensaver collects the cores while you aerate, if desired.

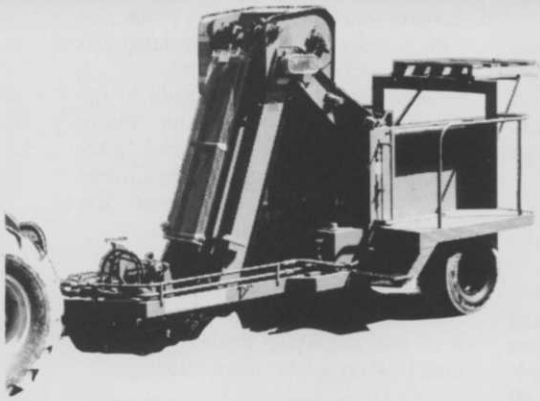
Get a free demonstration of the complete Cushman Turf-Care System from your Cushman dealer. Or, write direct for complete information.

CUSHMAN TURF-CARE EQUIPMENT

OMC-Lincoln
a Division of
Outboard Marine Corporation

P.O. Box 82409 · 3312 Cushman Drive · Lincoln, NB 68501

In 2 Minutes... You're Hooked with a "Tow-Boy" Sod Harvester



Operating behind any adequately sized, low speed tractor, the Princeton "Tow-Boy" allows complete flexibility in the use of your power supply...because of its exclusive "2 minute hook-up" capability. Harvest in the morning, mow, seed, and spray in the afternoon.

Save time, money and man hours. Increase production! No large field crew needed. Harvest over 13,500 sq. ft. of sod per hour with three-man crew. All sod is cut, palletized and ready to ship.

Perfect for smaller volume sod producer. Now, **you** can enjoy the high production and labor saving features of the larger Princeton harvesters...at one-third the cost. Ask for the "Tow-Boy" by Princeton.

There's a Princeton for Everyone.

AUTOMATIC

The only sod harvester that does it all...with just one man! Cuts, aerates, crosstie stacks, and palletizes 27,000 sq. ft. of sod per hour with a crew of one. Save time, money, and man hours. For the large volume sod producer who wants to increase production **and** profit – the Princeton "Automatic" Sod Harvester.

SELF-PROPELLED

Increase your profits...by reducing costs and increasing production. Three man crew can harvest 22,500 sq. ft. of sod per hour. For the medium to large volume sod producer who wants quality, high production and low maintenance at a moderate price. The Princeton "Self Propelled" Sod Harvester.

For additional information, write or call collect:

Rodger Osborne
Sales Manager
955 W. Walnut Street
Canal Winchester, Ohio 43110
614/837-9096

PRINCETON
MANUFACTURING COMPANY
Dealer/Distributor inquiries invited

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WT&T EVENTS

ALCA Interior-scape Symposium, Hyatt Regency O'Hare, Chicago, Ill., Apr. 20-21, 703/893-5440.

Seventh Annual Olds Turf School, Olds College, Olds, Alberta, Canada. May 5-6. Walter Gooder, Box 371, Edmonton, Alberta, Canada T5J 2J6.

Perlite Institute 29th Annual Meeting, Hotel Libertas, Dubrovnik, Yugoslavia, May 14-16, Robert Milanese, Managing Director, Perlite Institute, Inc., 45 West 45 St., N.Y., N.Y. 10036.

Texas A & M University Turfgrass Research Field Day, Turfgrass Field Lab, Agronomy Rd., College Station. May 24. James Beard or Richard Duble, Department of Soil & Crop Sciences, Texas A & M University, College Station, Texas 77843.

American Association of Botanical Gardens and Arboreta Annual Meeting, Royal Botanical Gardens, McMaster University, Hamilton, Ontario, Canada. May 28-June 1. Leslie Laking, Royal Botanical Gardens, Box 399, Hamilton, Ontario, Canada L8N 3H8.

Canadian Land Reclamation Association Third Annual General Meeting, Sudbury, Ontario, Canada, May 29-June 1, Canadian Land Reclamation Association, Box 682, Guelph, Ontario, Canada N1H 6L3.

103rd American Association of Nurserymen Convention, Fairmont Hotel, New Orleans, La. July 15-19. American Association of Nurserymen, Inc., 230 Southern Bldg., 15th and H Streets, NW, Washington, D.C. 20005. 202/737-4060.

American Sod Producers Association Summer Convention & Field Days, Sheraton-Spokane, Spokane, Wash., July 19-21, 402/463-5691.

The South Carolina Plant Food Educational Society Annual Summer Meeting, Holiday Inn, Hilton Head, S.C. July 30-August 1. A. B. Everett, Secretary-Treasurer, TSCPFES, 615 Saluda Ave., Columbia, S.C. 29205.

ALCA Reclamation/Erosion Control Symposium, Marriott Hotel, Denver, Colo., Aug. 3-4, 703/893-5400.

Tenth Biennial National Christmas Tree Convention, Amherst, Mass. August 16-18. National Christmas Tree Assoc., 611 E. Wells St., Milwaukee, Wisc. 53202.

Northwest Turfgrass Conference, Holiday Inn, Richland, Wa. Sept. 25-28.

International Pesticide Applicators Association Annual Convention, Sea-Tac Motor Inn, 18740 Pacific Highway South, Seattle, Wash., Sept. 13-15, Ed Walters, 206/362-9100.

Which one will cost you less?

If you're only concerned with initial equipment costs, then the obvious answer is the sod shovel.

But the real cost of cutting sod also includes the labor time involved. And at today's wages, elbow grease can be a very expensive accessory.

That's why the Ryan Jr. Sod Cutter makes sense for even the smallest turf management operations.

Working at up to 135 feet per minute, one man can cut more sod in an hour than six men used to cut by hand in six hours. Add up the labor cost savings and you begin to see the Jr. Sod Cutter might easily pay for itself in just one season.

But the Jr. Sod Cutter also lets you take advantage of the benefits of sodding versus seeding. You can replace dead grass or plant a new stand almost instantly, preventing erosion and enhancing the appearance of your grounds.

The Jr. Sod Cutter is self-propelled, simple to use and easy to handle. And like all Ryan equipment, it's built to last. You may never need a replacement.

So whether you manage a small golf course, cemetery, landscape service, school grounds, industrial complex, or park, the Jr. Sod Cutter can help you trim costs.

Write for your Ryan catalog today. And find out more about all the time-and money-saving equipment Ryan offers.

Ryan Jr. Sod Cutter

The turfman's timesaver.

®RYAN TURF-CARE EQUIPMENT

OMC-Lincoln, a Division of Outboard Marine Corporation
6616 Cushman Drive
P.O. Box 82409
Lincoln, NB 68501

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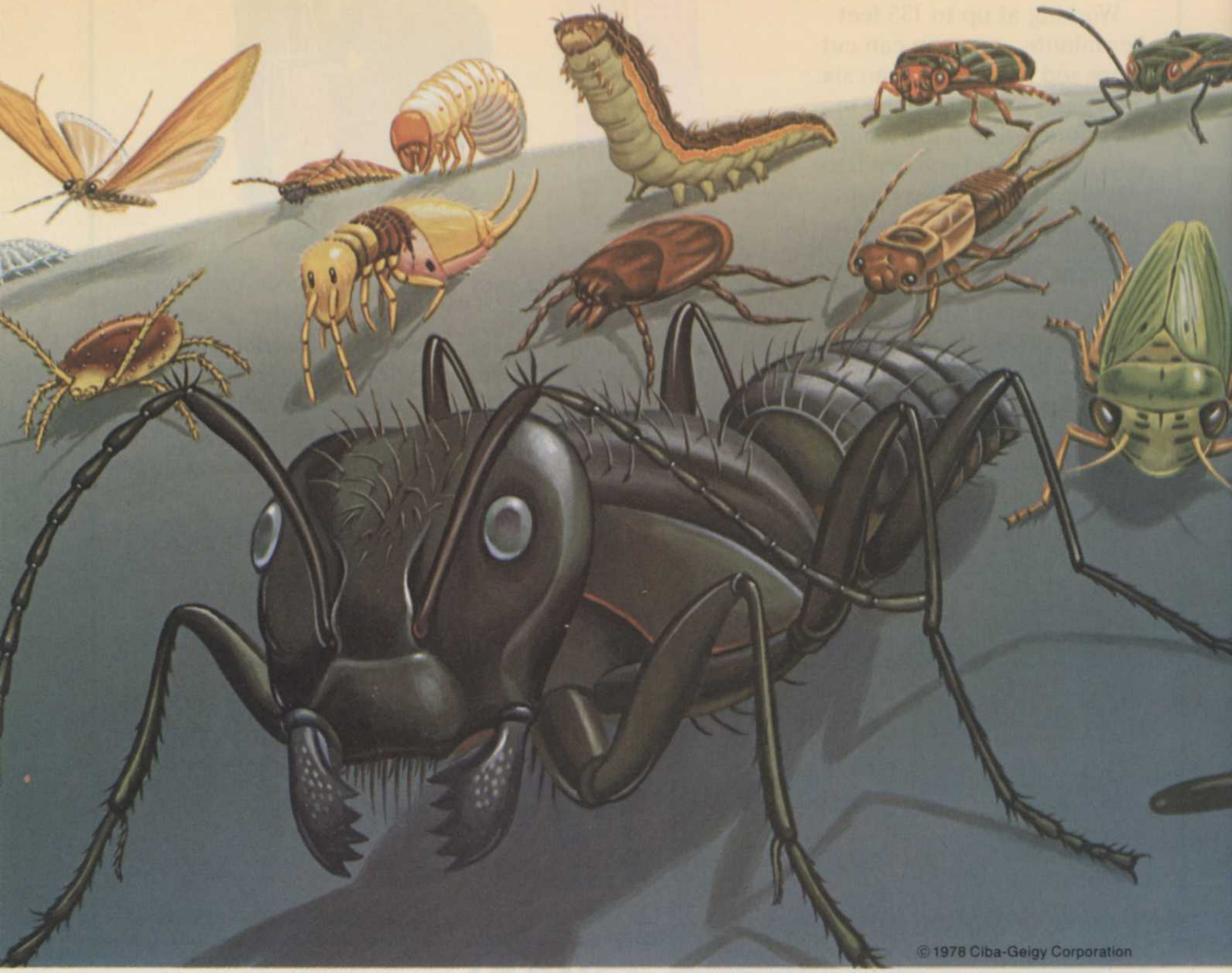
For ad on following page circle 150 on free information card

Diazinon is labeled for
How many will you

Diazinon® not only controls, but is labeled for more turf insects than any other turf insecticide.

Just take a look, it's the biggest label in the business.

You'll count 24 turf insects in all. Including white grubs, sod webworms, cutworms, chinch bugs,



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every insect on this page. face this season?

armyworms and ants.

This season, be sure to ask your local supplier for Diazinon.

And put the biggest label in the business to work for you.

Ciba-Geigy, Ag. Div., Box 11422, Greensboro, NC 27409

Diazinon by CIBA-GEIGY
The biggest label in the business.

CIBA–GEIGY

WT&T PRODUCTS

POWERFUL DIESEL TRACTOR features 12 speeds (3 in reverse), quiet operation, and two or four-wheel drive. The 25-hp Bull, by Satoh Agricultural Machine Mfg. Co., has a two-cylinder, water cooled, overhead valve engine and hydraulics that are live with position control, flow control, and lift lock. Operator station emphasizes comfort and easy control.

Circle 701 on free information card

TOW-BEHIND SWEEPER from Sweepster Inc. can be towed by truck, tractor, or other utility vehicle to sweep paved areas. The TP-60 can be towed at highway speeds for fast transport and is designed for quick change to towing vehicle. Brush is powered from the prime mover PTO. Mechanical or hydraulic brush drives are available for various applications. Over-the-brush pickup simplifies operation and hydraulic dumping of hopper increases efficiency.

Circle 702 on free information card

SKID MOUNTED SPRAYERS for high-volume field operation and road speed efficiency is made by Ag-Chem Equipment Co. Tank size varies from a 300-gal. polymer tank,

Most good golf courses, parks and home lawns have something in common — FINE LEAFED FESCUE

Oregon Fine Fescue - *thrives in shady areas, does well in dry spells, germinates fast and blends well. Its straight-growing habit holds the grass up for even mowing, and Oregon grown Red Fescue even creeps to cover the spots left when other grasses fail.*

Oregon Fine Fescue **the grass seed on which the best mixes are built.**

For a brochure and sample, write: Oregon Fine Fescue 1349 Capitol N.E. Salem, Oregon 97303

Twenty-three ways to help assure your company's future.

If you believe that a continuous flow of new ideas is absolutely necessary to assure your company's future—and the future of the country as well—then you'd better send for this free booklet today.

It describes twenty-three different ways you can help guarantee a continuous flow of college-trained minds and college-based research—minds and research that have been responsible for many of the most important ideas of our times. Computers. Radio. Television. Synthetics. Antibiotics. The list is almost endless.

If new ideas foster the continued growth of business, then business must be willing to foster the growth of ideas. By giving to the college of its choice. Think of it as an investment in your R. & D. Program. For twenty-three smart ways to make this investment, send in the coupon.

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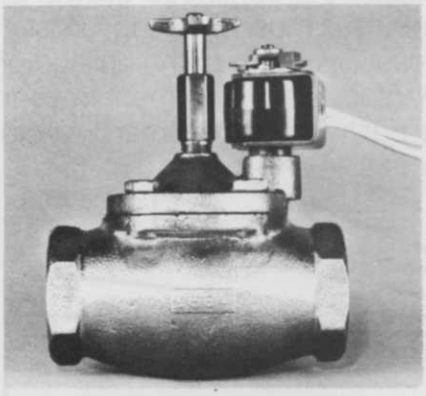
Ad Council

Make America smarter. Give to the college of your choice.

a 400-gal. polymer or stainless tank, and a 500-gal. stainless tank. All tanks feature large fill holes, full-length stainless steel sparger for chemical agitation, and large gathering sump for complete emptying. Sprayer unit fits in almost any pickup truck bed and has adjustable controls.

Circle 703 on free information card



ELECTRIC DIAPHRAGM VALVE from Johns-Manville has no minimum flow restrictions and uses a three-way solenoid operation. Series 930 valve is available in five models for various irrigation uses. Solenoid operation is designed to eliminate continuous internal flow, reduce the chance of malfunction, and reduce the incidence of water hammer. Valve is grit resistant and includes a water filter for longer wear.

Circle 704 on free information card

IRRIGATION CONTROLLER from Batrow Inc. is designed specifically for residential and commercial applications. Model 111-12 can control up to 11 zones with timing up to several hours per zone. Controller features a heavy gauge steel cabinet with lockable cover and a hinged control panel for easy access in installation and service.

Circle 705 on free information card

ONE-MAN EARTH DRILL by Ground Hog Inc. eliminates torque kickback by using a right-angle drive line, which permits drilling close to walls and fences. Handle bars swing to three positions for normal drilling,

VERMEER:

Nobody offers you more ways to increase productivity and reduce land improvement expenses than Vermeer.

Vermeer Tree Spades. Patented tree-moving/tree-packaging machines that automatically dig, ball, transport and replant shrubs and trees up to 25 ft. in height. Tractor-mounted, trailer-mounted, or truck-mounted units—plus complete multi-purpose landscaping machines that handle a tremendous assortment of dirt-handling functions in addition to transplanting trees.

Vermeer Trenchers. Multi-purpose underground machines with a wide variety of money-saving dirt-handling attachments. On tracks or rubber tires. With power ranges from 18 to 195 hp. With digging capacities of 4-36 in. wide, down to 12 ft. deep. Vermeer Vibratory Plows, for installing cable directly underground without damaging finished surfaces or landscapes.

Circle 132 on free information card

close drilling, and easy repositioning when auger is attached. Model 1M drill features a 5-hp engine, 4-ft. drilling depth, 16-in. tires, and augers in diameters from 2 to 12 in.

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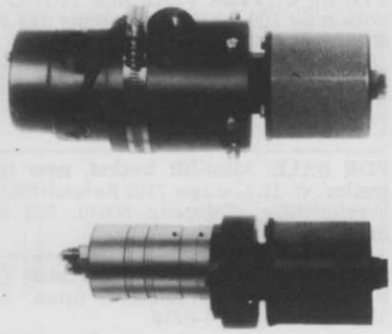

SPRAY HEADS provide precise control of droplet sizes through a selection of replaceable porous sleeve assemblies. Models 360 and 361 Beecomist heads from Beeco Products Co. will deliver fluid sprays, wettable powders, and heavy flowable sprays in 20-100 micron droplets. Delivery rate of 1 oz. to 8 gal. per min. permits decreased loads, use of smaller equipment, and greater efficiency. Hydraulic or electric drive is available.

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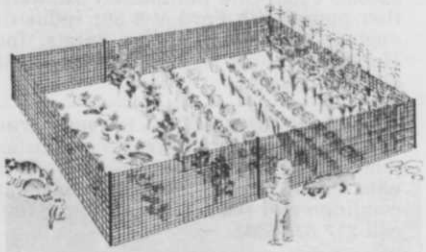

TEMPORARY FENCING by Ross Daniels Inc. is made of nonburning plastic mesh that can be attached to stakes for lawn protection. Each package of fencing measures 50 x 3 ft, costs less than half that of metal fencing, and is reusable.

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HERBICIDE APPLICATOR from Vandermolen Corp. uses a ribbed roller alongside shrubbery to prevent drift of weed killer into adjacent plants. Roller coats and flattens entire weed surface for even spreading. Model BP27 Driftmaster has a 5½-gal high density polyethylene tank.

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BIG SAVER

Vermeer Stump Cutters. Fastest, easiest, most economical method of removing tree stumps. With four powerful machines, each equipped with a big hydraulically controlled cutting wheel that actually chews even large stumps to chips 6-24 in. below the surface . . . in minutes!

Vermeer Root Cutter. A great preventative maintenance machine that severs tree roots before they buckle sidewalks or streets.

Vermeer Log Splitters, available as self-contained units or designed to operate off the hydraulic system of your tractor. Instant firewood . . . with 22,000 lbs. of force.

Sure, We Demonstrate . . . Ask Us!

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THE DIGGIN' DUTCHMAN

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When answering ads where box number only is given, please address as follows: Box number, c/o Weeds Trees and Turf, Dorothy Lowe, Box 6951, Cleveland, Ohio 44101.

Rates: All classifications 65¢ per word. Box number, $1. All classified ads must be received by Publisher the 5th of the month preceding publication date and be accompanied by cash or money order covering full payment. Mail ad copy to: Dorothy Lowe, Weeds, Trees & Turf, P.O. Box 6951, Cleveland, Ohio 44101.

USED EQUIPMENT

2 — 50' AERIAL BASKETS, brush chipper, stump cutter, 2 sprayers, small crane. Parkway Tree Service, 12026 West Cherry St., Wauwatosa, Wisconsin 53226. 414 257-1555.

FOR SATE — 1975 Vermeer TS-22" tree spade. Mounts on Bobcat or 3 pt. hitch. Excellent condition. $1800.00. 1976 Care tree 30" tree spade. Mounts on Bobcat or 3 pt. hitch. Mint condition. $2995.00. 1976 Care tree 36" tree spade. Mounts on 990 Bobcat, tractor, loader, or dozer. Mint condition. $4495.00. 1972 Vermeer TS-44T tree spade on 1974 GMC 1 ton. New spades. Good condition. $7800.00. Will send photographs upon request. Call or write: Spartan™ Tree Transplanting Equipment Company, 16084 S. Chandler Rd., East Lansing, Michigan 48823. Phone 517 351-1370. (We buy, sell, and repair high quality tree transplanting equipment).

FOR SALE: Two Ryan 18" sod cutters, automatic cut off, $600.00 each. Two 18" sod rollers, good working condition, $250.00 each. One Rainmaster 6x6 irrigation pump with Ford V-8 391 industrial engine, $2,500.00. Mueller Farms, Inc., Huntley, Illinois, 815 923-4368 days. 312 669-5794 nights.

FOR SALE: 1976 GMC 1½ ton spray truck w/1000 gallon tank, Meyers multistage pump, hose, and hose reel. This truck with only 13,000 miles on it is in excellent condition and ready to spray! For details call 217 529-5692.

FOR SALE: Brouwer 16" harvester with Massey tractor, very good condition, asking $10,000; Del Zotto 28" front mounted tree transplanter, new, $3,000. Tom Selstad, Selstad Soil Service, R1 West, Box 43, Great Falls, Montana 59401. 406 452-5158.

JACOBSEN SEEDER, model 524-100, 21 inch width, self-propelled, new condition, $1,200. Jim Dunlap, 23 Haines Mill Road, Delran, N.J. 08075. 609 461-8694.

USED CHIPPERS, SKYWORKERS and hydro-ax's. Please call P. C. Gould Sales Company, Box 178, Essex, Connecticut 06426. 203 767-1636 Phil or Jeff Gould.

STUMP CUTTER VERMEER MODEL 10 with only 100 hours. Telephone 203 261-4806, Connecticut, after 6:00 at night.

USED 72" Hustler and Jacobson F 133 five gang mower, both in excellent condition. Call 707 642-2525.

FOR SALE: Mini-lift bucket, new with trailer. W. H. Garage, 7102 Raleigh Street, Westminster, Colorado 80030. 303 428-2174.

SELLING NEARLY NEW Princeton Tow Boy harvester, $11,000.00, open. Ted Thompson 412 961-0238.

FOR SALE: Clean CL-15 Vermeer vibratory cable plow and boring attachment. $1,875.00. Phone 517 448-2980, Swanson Spray, Hudson, Michigan.

Continues on page 100

Weed-eating fish cleans lakes.

For 2,000 years, the Amur has been used to keep lakes and ponds clear of choking weeds and smothering algae. It's the only fish in the world which lives exclusively on weeds, grass and algae. Tested in America for over 12 years, the Amur has proven successful in golf course ponds, reservoirs and small lakes. And at far less cost than expensive repeated chemical applications. For details, call or write Bill Whiting, general manager, (501) 942-2515.

SEA RANCH, INC.

Aquatic vegetation control is our only business.
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Making higher profits is a grind.

Stump the competition with a Levco Stump Grinder

Your business will put more money in the bank when you add a dependable Levco Stump Grinder to your equipment stable! Tow it to the job behind any vehicle and it will cut any diameter stump from four feet high to two feet below the ground! It's fast, efficient . . . and safe! For a personal demonstration, just drop us a note. Better yet, call us today. We'll be glad to show how your company can turn a profit with this money-making eager beaver! After all, we want to sell you more than just a machine; we want to sell you a profitable business!

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Phone: 517/351-1370

Offering a complete line of tree & landscape equipment: Big John Tree Transplanters • Newman Tree Frames & Trailers • CareTree Systems • Levco Stump Cutters • Cobra Air Hammers • Owatonna Loaders • Dakota Trailers • Chipmore Chippers

Circle 113 on free information card

Now, rid your lake of unwanted water weeds and algae.

Recreational lakes, ponds and streams are meant to be fun places. Not choked with unwanted water weeds or ugly algae. Now, Pennwalt offers two great aquatic herbicides that clean up these problems—fast and effectively.

Meet Aquathol® K and Hydrothol® 191 aquatic herbicides. Aquathol K is available as a liquid or granular. It controls weeds efficiently and quickly. In fact, you can swim in lakes treated with Aquathol K 24 hours after application. And treated water can be used immediately for golf course irrigation without harm to bentgrass turf. Hydrothol 191 does even more. It controls both weeds and algae. And after treatment, there's no waiting period for swimming. Put Aquathol K or Hydrothol 191 to work for you.

For a cleaner, prettier lake.

For more information, contact AGCHEM DIVISION, PENNWALT CORPORATION, 1630 E. SHAW AVE., FRESNO, CALIFORNIA 93710 (209) 226-8400

All pesticides can be harmful. Read the label carefully and use only as directed.

PENNWALT

CHEMICALS ■ EQUIPMENT
HEALTH PRODUCTS

Classifieds *from page 98*

SEEDS

SOD QUALITY Seeds: Adelphi, Glade, Cheri, Nugget, Merion, Flyking, Majestic, Baron & Touchdown bluegrasses, also fine fescues. Manhattan ryegrass. Custom mixing available. Michigan State Seed Co., Grand Ledge, Michigan 48837. Phone 517 627-2164.

HELP WANTED

GOLF COURSE TURF PROFESSIONALS: An opportunity to sell Pro Turf® products. ProTurf Division of O.M. Scott & Sons, the nation's leading manufacturer and marketer of professional turf products, has openings for Technical Representatives in several territories. The Tech Reps selected will call on golf course superintendents, requiring a knowledge of turf management and an understanding of these professionals' needs. Applicant should have a BS degree or equivalent in one of the agronomic sciences. Excellent starting salary plus bonus, automobile, and a comprehensive benefits program at no cost to employees go along with these positions. Send resume in confidence to Dick Stahl, Director of ProTurf, O.M. Scott & Sons, Marysville, Ohio 43040. An equal opportunity employer.

PARK MAINTENANCE SUPERVISOR — Pasadena, California (poupulation 113,-000). Salary — middle $20,000 annualy. Requires B.A. in park management/administration or related field, four years of progressively responsible experience in park or landscape management, two years of which must have been in a supervisory capacity and possession of California driver license. (Two years additional related experience may substitute for up to two years of education with an A.A. in park management/administration). Landscape management experience must include knowledge of proper use and control of pesticides and herbicides, maintenance of turf, trees, and shrubs, and of irrigation systems. Apply immediately to Personnel Department, City of Pasadena, 100 N. Garfield Avenue, Pasadena, California 91109. Phone 213 577-4366.

SUPERINTENT: A quality midwest cemetery organization requires the services of an outside man with leadership experienced of at least 5 years to supervise land development, maintenance of turf, nursery materials, buildings and fleet equipment and handling of interment services by personnel. 100 acres, half developed; populatio of community 400,000. The individual will do his own hiring and earn $15,000 to $20,000 per year depending on qualification, plus full employee benefits. Please send resume in detail to Box 190, Weeds, Trees and Turf, Box 6951, Cleveland, Ohio 44101.

ASSISTANT SUPERINTENDENT or grounds foreman: Attractive memorial gardens located in north midwest has an excellent opportunity for an experienced assistant superintendent or a grounds foreman. Applicant should have a minimum of five years cemetery experience and at least two years in a supervisory position. All inquiries strictly confidential. Please send resume to Box 191, Weeds, Trees and Turf, Box 6951, Cleveland, Ohio 44101.

ASSISTANT MANAGER for mid-western sod farm. Will train but some sales or management experience necessary. Send resume including salary requirements to Box 188, Weeds, Trees and Turf, Box 6951, Cleveland, Ohio 44101.

OPERATIONS MANAGER — must have experinece in planning, scheduling, and supervision of field crews, preferrably in non-agricultural herbicide application. Other responsibilities: personnel function and overall equipment maintenance. Considerable travel with 4-state territory required. Unlimited opportunity with growing herbicide application firm, doing business primarily with state and county highways and utilities. Contact: Lex Dalton, Dalton Gang, Box 246, Warsaw, Indiana 46580.

LANDSCAPE-LAWN CARE-ESTIMATOR-SALESMAN. Opportunity for advancement with established firm offering landscape and turf care services. Salary and liberal fringes. Experience in direct selling and job cost estimating essential. Send resume to: Jeff Kahnke, Vice President, Tree Service, Inc., 6000 W. 78th Street, Edina, Minn. 55435.

TEXAS, Dallas and Houston. Licensed Landscape Architect needed. Experience in private offices desired. Position in design/build firm; salarly negotiable with experience. Full benefits. Please send resume, photograph, and samples of your work to Landscape Design & Construction, Inc., 2559 Southwell, Dallas, TX 75229.

LANDSCAPE SUPERVISOR (City of Santa Clara). Parkways and Boulevards Division head, Street Department. A.A. degree in Horticulture and 5 years experience. Other education and experience patterns may substitute. Salary open. Send resumes to Testing Division Office, 1500 Warburton Avenue, Santa Clara, Calif. 95050. Telephone 408 984-3040.

FOR SALE

RAILROAD TIES. 5,000 No. 1 landscaping ties banded in stacks of 25. Excellent condition, not splite or rotted. We make immediate delivery in minimum loads of 250 anywhere in U.S. Inquiries welcomed 8:00 A.M. to 5:00 P.M. Monday thru Saturday. Midwest Railroad Tie Sales, 541 S. Range Line Road, Carmel, Ind. 46032. Phone 317 844-7620.

1977 TORO GMT 200 TRACTOR (with the following attachments): 48" rotary mower, cab enclosure, catalytic heater, 42" snowthrower, wheel weights, one set of tire chains. One year old, 226 hours, excellent condition. Purchased $5,800.00, aksing $4,600.00. Please contact or call: Manager, Park Meadows Home Association, 4153 West College Avenue, Milwaukee, Wisconsin 53221. 414 421-0061.

MAKE BIG MONEY with biggest efficient tank truck sprayer, 1800 gallon, livetime, double stainless oval tank with insulation, 60 G.P.M. high pressure F.M.C. pump, Wisconsin engine and more. Doubles as water or chemical tanker or other uses. Save now. Paul Bunyan Mfg. 603 Union Road, R2, Lebanon, Ohio 45036. 513 424-1051.

LAWN-GARDEN-FEED STORE. Grossing $300,000.00 yearly. Sales, service, parts. Excellent location, east of Cleveland, Ohio. Business only $40,000.00 plus inventory of approximately $60,000.00. Send inquiries to Box 194, Weeds, Trees & Turf, Box 6951, Cleveland, Ohio 44101.

FOR SALE — Complete tree service company 23 years in business New England area. Equipment modern and good condition. Excellent clientele. Box 192, Weeds, Trees and Turf, Box 6951, Cleveland, Ohio 44101.

FOR SALE: Landscape contract business. Snow removal in winter. Can be bought on contract for deed. Write to: Morris Landscape Contractors, Stonehedge, Winona, MN 55987.

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Sub-Soil Moisture Tester

AQUAPROBE takes the guesswork out of soil moisture testing. Scientifically measures moisture at depths from 2 to 26 inches. No digging; no fixed point of measurement. Amazingly light-weight, portable and easy to use. Aquaprobe is low in cost, too. Write:

HOWARD S. CRANE, INC.
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WATCH FOR SPECIAL WEEDS TREES & TURF CIRCULATION OFFER IN YOUR MAIL THIS MONTH!

◆ For ad on preceding page circle 104 on free information card

Gordon Leishman measures the extra growth after using Jobe's Evergreen Spikes.

"My trees doubled the growth rate after I used Jobe's Spikes."

Gordon Leishman of Idle Hour Country Club, Lexington, Ky., is enthusiastic about the results he achieves after using Jobe's Spikes. Trees added four inches more growth than he expected. He used Jobe's 12-6-8 Evergreen Spikes in the fall of 1975 to help trees winter over, develop strong root systems and provide a reservoir of nutrients for spring growth. And he's been using Jobe's Spikes ever since.

Jobe's Spikes get right to the root of your professional tree care needs.

In every type of climate . . . every kind of soil from sand to heavy clay, Jobe's Spikes have proved their effectiveness.

University studies have shown that Jobe's Spikes are better than surface-applied fertilizer. And there's no danger of burning turf or excessive leaching.

Jobe's patented binder forms the fertilizer into easy-to-drive spikes and provides for uniform release of nutrients. A plastic cap is included to make driving Spikes easier and to protect the Spike while you drive it. The analysis of Jobe's Tree and Shrub Spikes is 16-8-8. Evergreen Spikes are 12-6-8. Fruit Tree Spikes are 5-15-15. Rainwater or soil moisture carries the fertilizer down to the root zone.

Call your local Jobe's distributor or order direct. $30 per case (105 Spikes) prepaid, 5 case minimum. 15 or more cases, $25 per case. 36 or more cases, $22.50 per case.

Jobe's®
TREE & SHRUB SPIKES

The easy method for professional tree care. International Spike, Inc., 1081 Dove Run Road, Lexington, Kentucky 40502

Classifieds from page 100

MISCELLANEOUS

Milky Spore Bacteria Eliminates
JAPANESE BEETLES
One Treatment is FOREVER
Eliminates 41 Different White grubs
Apply any time ground is not frozen.
2½ lb . . . $21.99 10 lbs. . .$ 79.00
1 lb . . . . $ 8.99 25 lbs. . .$189.00
Use 1 lb. per 4,000 Sq. Ft. Add 5% for
Handling and Shipping, $1.25 minimum.
84 Page Catalog — Seeds, Shrubs, Growers Supplies . . . . Stamps Appreciated.
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WE DIG TREES. Will move large trees (5" to 10") with 78" tree spade. Will travel. Call or write Floral City Tree Service, 891 N. Dixie Hwy., Monroe, Michigan 48161. 313 241-7510.

POSITION WANTED

GROUNDS SUPERINTENDENT seeking responsible, challenging position in grounds maintenance or related commercial field. Presently 8 years as superintendent of 100 acre industrial park with recreational facilities. Two years supervisor with commercial tree-landscape firm, B-S degree. Resume upon request. Box 193, Weeds, Trees & Turf, Box 6951, Cleveland, Ohio 44101.

UNIVERSITY GROUNDS SUPERINTENDENT seeks to relocate. Broad horticultural background. Resume upon request. Box 189, Weeds, Trees and Turf, Box 6951, Cleveland, Ohio 44101.

BUSINESS OPPORTUNITIES

WANT TO BUY OR SELL a golf course? Exclusively golf course transactions and appraisals. McKay Golf & Country Club Properties, 15553 N. East St., Lansing, Michigan 48906. Phone 517 484-7726.

LEARN LANDSCAPING and the Growing of Plants at home. Start a satisfying business or hobby. Free booklet. Lifetime Career Schools, Dept. A-398, 2251 Barry Avenue, Los Angeles, Ca. 90064.

WANTED TO BUY

LINDIG OR ROYER SHREADERS. Any size age or condition. Art Lewis 813 299-2106, 355 5th Street. S.W., Winter Haven, Florida 33880.

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AAA TREE SERVICE, INC. is interested in buying all types of used tree equipment. 1292 South Eastlake, Longwood, Florida 32750. Phone 305 339-5242.

COMPANY ENGAGED IN TREE trimming or brush cutting. Would prefer gross of at least $250,000.00 per year, but would consider one with less. All replies confidential. Reply to Box 358, Cedar Knolls, New Jersey 07927.

800 GALLON HYDROSEEDER, 18" Ryan sod cutter, 5 — 7 gang mowers. Wetmore, Fredericton, N.B., Canada E3B 4X7. 506 454-6228.

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Joe Guarise, Jeff Dreazen

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Atlanta, GA 30319.
404+252-4311.
Richard Gore, Sales Manager.

SAN FRANCISCO
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San Francisco, CA 94104.
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Robert A. Mierow,
Western Manager.

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213+933-8408.
John Sanford, Western Manager.

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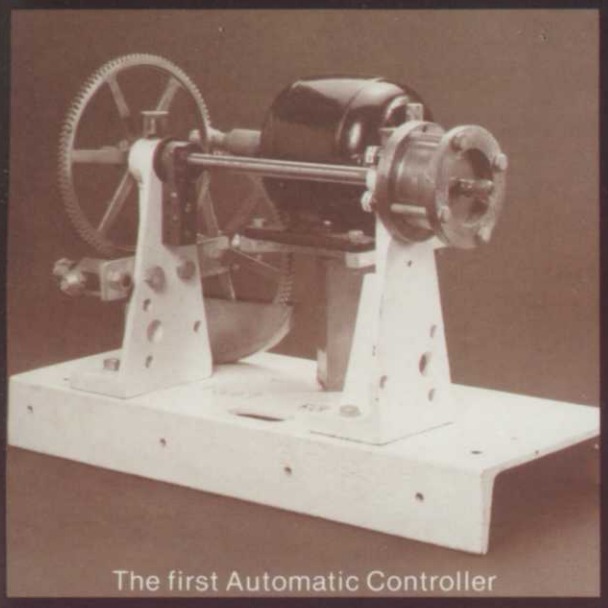

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MOODY
IRRIGATION EQUIPMENT
SINCE 1923

"After 54 years: We're still the ONE"

- 54 years in the manufacturing of Irrigation Equipment
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- Manufacturers of quality, reliable brass Impact and Spray-head Sprinklers

MOODY SPRINKLER CO., INC. 3020 Pullman Street, Costa Mesa, California 92627

The shot heard 'round the Turf world:

Yorktown II

Turf-Type Perennial Ryegrass

SO GOOD IT'S REVOLUTIONARY!

Revolutionary because: Yorktown II rated the best in summer performance (heat tolerance) in tests conducted at Rutgers University under the direction of Dr. R. Funk. . .yet rated number one in fall and winter performance as well. The "all-year long" ryegrass.

Revolutionary because: Yorktown II rated number one in turf quality in tests conducted at the Beltsville Agricultural Research Center under the direction of Jack Murray.

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Add to these new test results the qualities you've come to expect from using Yorktown. . .good color, fast germination, great seedling vigor, neat mowability and a great compatability with varieties like Jamestown fescue for use in southern overseeding programs. No wonder YORKTOWN II is so good. . .

It's Revolutionary

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From the producers of Baron Kentucky Bluegrass.

Available through all Lofts divisions and leading seed houses.

LOFTS

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